# Now's the Time to Dust Off Your Resume

**By Ann Dooley**
Of the CW Staff

It's an employees' market today for programmers and systems analysts — "somewhere between the verge of insanity and total chaos," according to Joe Austin, New England DP account executive for Dunhill Corp., a personnel agency.

## The Human Connection

Programmers and analysts are in such demand they can pick and choose where they want to work, for whom and for how much, personnel recruiters said.

When the economy began moving again, industry people expected total DP budgets to increase accordingly. But the rapid expansion has created openings which surpassed their expectations, and employers are having a hard time finding enough people.

At least 60% of the DP shops have at least one opening and there's a 12% shortage of personnel in the New England area alone, Austin estimated.

Job openings are steady; when one person leaves to take a job, he creates an empty slot, he said.

"When I find somebody, I have to dig them out of the woodwork, they're certainly not coming in off the streets," according to Ron Cohen, another Dunhill representative. Approximately 90% of Dunhill's placements are made by recruiting — head hunting — and referrals, Austin added.

The industry began opening up last fall and it has been crazy ever since, according to Kathy Steinberg, *Computerworld* manager of recruitment advertising. To illustrate the growth, she said that in January 1976 there were 15.83 pages of position announcements; in the same month this year, the number of pages dedicated to position announcements had increased to 44.4.

Companies are expanding their market lines and need programmers and analysts to support them.

*(Continued on Page 4)*

COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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NEWSPAPER

# Ansi 'Asciing' For Comments

**By Don Leavitt**
Of the CW Staff

WASHINGTON, D.C. — Twenty-five additional controls have been proposed for use with the American Standard Code for Information Interchange (Ascii) in both 7- and 8-bit configurations.

The proposed standard is out for public comment until May 28 and the vice-chairman of the technical committee that drafted it said its success "will be enhanced" by "careful and wide review."

The new standard is meant to supplement work done by the American National Standards Institute (Ansi) when it established Ascii in 1968. The proposal codifies control functions needed by the current technology of two-dimensional character-imaging I/O devices such as CRT terminals, Robert N. Hastings of Digital Equipment Corp. said.

The original Ascii was oriented almost entirely to teletypewriter functions and provides no guidance for the more flexible capabilities of newer devices, he added.

### Equipment Affected

Devices potentially affected by the proposed standard include interactive terminals (both CRT and hard-copy), line printers, microfilm printers and composition imaging (typesetting) and word-processing systems, Hastings said.

I/O devices with auxiliary units, with or without buffering, may also be affected. Though many of the controls are expected to be handled by function keys, some might be implemented through software, he said.

Controls covered by the proposal include editing functions, formatting and the specification of input areas as well as status setting, interrogation, mode selection and typesetting composition functions. The standard does not include any network or data transmission controls, he emphasized.

It uses a multiple-character structure to obtain 78 distinct functions and a uniform method of representing both numeric and selective parameters to indicate dimensional quantities and to obtain 88 more subfunctions.

Comments on the pending proposal should be sent to Robert E. Brown, Director of Standards, Computer and Business Equipment Manufacturers Association, 1828 L Street N.W., Washington, D.C. 20036.

Copies of the 100-page proposal are available from Brown for $3.

## Rather Than Patents

# Copyrights Urged for Software Protection

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Some form of legal protection for software and commercially available computerized data bases is warranted, and that protection should be a copyright rather than a patent, according to subcommittees of the National Commission on New Technological Uses of Copyrighted Works (Contu).

Strong proponents for every form of protection for programs exist, Michael S. Keplinger, Contu's assistant executive director, told members of the Computer Law Association (CLA) here last week.

But copyrighting appears to be the easiest approach for those seeking protection and those administering the process, he said.

The Contu Subcommittee on Software tends to favor copyrighting over patents and trade secrets, he continued, because a uniform body of law exists at the federal level in this area, especially under the new copyright law scheduled to go into effect next year.

In addition, copyrights are inexpensive to acquire, difficult to lose and handy in instances where information will be marketed on a large scale. Copyrights also promote the dissemination of information, he said.

In contrast to copyrights, patents are expensive to obtain and are characterized by long delays. A patent would protect the basic concept or algorithm behind a program, but not the means of expressing that idea — which is what the copyright guards, Keplinger added.

Patents would only be available for a limited number of programs meeting the "novelty" standard. Software does not have to be novel to meet copyright requirements, he noted.

Independent studies indicate trade secret claims and contractually based licensing agreements are the principle means used to protect software at the present time.

However, since trade secret laws are state rather than federal laws, they lack uniformity.

Another disadvantage of this approach is that protecting software as a trade secret requires extensive security and is inherently hostile to the free flow of ideas, he said.

Like patents, trade secrets tend to be expensive to establish and difficult to apply to large markets, Keplinger said. For these reasons, the subcommittee will probably recommend that computer programs be

*(Continued on Page 6)*

# User's Role in System Design Seen Eliminated by Reform Act

**By Ronald A. Frank**
Of the CW Staff

WASHINGTON, D.C. — Passage of the Consumer Communications Reform Act would mean that "user participation in communication system planning and implementation would be completely at the discretion of the phone companies," according to Rep. Lionel Van Deerlin, chairman of the House Subcommittee on Communications.

Delivering the opening address at the DataComm 77 conference here last week, the California Democrat said a key element of the proposed Bell-fostered legislation seeks to preserve "end-to-end service" for the phone companies.

"We recognize your desire for a role in designing, implementing and operating your data communications systems," he told the conference attendees, adding that "Congress must look after the interests of all users large and small, business and residential, urban and rural.

"You in the data communications user community are going beyond terminal equipment add-ons in the application of your data processing expertise to network analysis and implementation. The presence of the computer in the communications system gives the user much more discretion than has been historically practical," Van Deerlin said.

"Software can be tailored to special needs in a way which would never be possible in a hardware-only environment. This represents a challenge to the telephone industry policy of total responsibility," he said.

It also suggests "the need for a pluralistic industry environment reflecting the pluralistic requirements of communications users," he added.

"I believe the telephone industry recognizes that total responsibility, complete end-to-end service is no longer workable. Communications facilities are applied to too many applications these days and there

*(Continued on Page 4)*

# Sink or Swim

DPers shouldn't breathe a sigh of relief just because spring-like weather is upon us. Mother Nature may still have a few surprises in store.

True, the warm weather is melting all the snow, but if it goes too quickly, flooding could present a danger to exposed computer centers in different parts of the country.

Areas such as Buffalo, N.Y., which received large amounts of snow throughout the winter now must worry where all that snow will go.

Buffalo still has 18 to 20 feet of snow on the ground. Whether the city will be flooded depends on the temperatures and the amount of rainfall over the next few weeks, according to Tom McGrath of the Emergency Planning Office for the U.S. Army Corps of Engineers.

In previous years, some DP installations have been forced to evacuate or move their equipment to higher floors to avoid flood waters capable of damaging or destroying valuable equipment and records.

DPers still remember the tremendous flood damage on the East Coast caused by tropical storm Agnes in 1972. Millions of dollars worth of equipment was lost, even more serious was the destruction of records and files.

Since flooding can't be predicted very far in advance, DPers should stand ready with mops, sandbags and sump pumps for emergency use.

And if all else fails, program your computer to swim to safety.

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## *Another Imbroglio*

# STC Says Documents Not for IBM's Eyes

**By Catherine Arnst**
Of the CW Staff

NEW YORK — Another imbroglio over IBM's demand for documents has erupted in the U.S. antitrust suit against IBM in progress here.

This time, Storage Technology Corp. (STC) is attempting to stop an IBM subpoena for documents STC fears could reveal trade secrets and long-range business plans.

STC manufactures and sells magnetic tape drives, magnetic disk drives and controllers that are competitive with similar products made by IBM.

Although faced with demands similar to those pressed against Itel Corp. last month [CW, Feb. 21], STC — unlike Itel — did not claim harassment.

IBM wants the STC documents for use in cross-examining three of that company's officers who the government has scheduled to testify later this month: Jesse Aweida, chairman of the board; Zoltan Herger, vice-president; and James MacGuire, executive vice-president.

Subpoenas were issued to the three between Jan. 14 and Jan. 17, and STC filed a motion with Federal Judge Sherman Finesilver in Colorado, where the firm is located, requesting relief.

Finesilver denied the motion and ordered STC to either begin producing documents by Feb. 23 or seek relief from Judge David N. Edelstein, who is hearing U.S. vs. IBM.

### Protection Requested

STC filed a motion with Edelstein on March 3 asking him to "protect [STC] from oppression, undue burden and expense and, further, to prevent [STC] from being forced to disclose trade secrets."

In an affidavit filed in response to the STC motion, IBM contended that STC would sustain "little or no burden at all in complying with the subpoenas" since STC officials had already told IBM attorneys that the only additional expense it incurred was in hiring two temporary employees to guard the documents.

STC's motion stated, however, that "at considerable expense, [STC] devoted substantial executive time to the effort to obtain information for IBM" since Aweida's deposition in September 1975.

The Colorado-based peripherals maker agreed to comply upon the representation by IBM that if such information were produced, there would be no further need for depositions, according to the motion.

STC did provide that information on Feb. 2 with certain customer and pricing details deleted.

### Question of Relevancy

STC particularly wants relief from IBM's subpoena of documents concerning product areas in which STC is competitive with IBM, claiming they are irrelevant to the issues in this case.

Also, STC has asserted claims of unlawful marketing practices and unfair competition against IBM which are not yet the subject of litigation.

The firm wants to protect documents relating to any possible future lawsuit against IBM and is claiming attorney-client privilege on those, sources said.

IBM attorneys have stated that Pretrial Order 13 in U.S. vs. IBM protects STC and provides procedures for dealing with sensitive information.

Further, Edelstein has "repeatedly held that the protection afforded nonparties by Pretrial Order 13 affords sufficient protection against any possible competitive injury," the mainframer said.

As to the question of relevancy, IBM contended the government intends to examine the STC witnesses very broadly and IBM must have the documents to prepare a thorough cross-examination.

"STC's objective appears to be to delay production [of the documents] long enough so that IBM will be unable to use undiscovered documents in connection with the examination and cross-examination of STC executives," according to the firm's affidavit.

Edelstein has requested the two parties to file affidavits regarding the number and description of the documents in question before making a decision on STC's motion.

# U.S. vs. IBM Dogged by Delays As Trial Focuses on Peripherals

By a CW Staff Writer

NEW YORK — Although the U.S. vs. IBM antitrust trial here has gotten four months older since the Justice Department began its story of how IBM allegedly attempted to quash competition in the peripherals market, only three of the 13 scheduled witnesses have taken the stand.

Delays caused by illnesses, holidays and short court days have protracted their appearances, but witnesses have completed testimony "about as quickly as could be expected," according to government attorney Burnie Boote.

In the meantime, other loose ends are still dangling, including misconduct charges filed by both parties in May of 1975 [CW, May 21, 1975] and the problem of finding a way to conduct a two-tiered system that would allow documents to be offered at the same time live witnesses are being heard [CW, Feb. 7].

Since Boote opened the peripherals portion of the trial Nov. 8, most of the documents detailing IBM's alleged predatory practices in the tape and disk drive markets have been filed as evidence. Approximately 150 — or half — the documents relating to the memory market have been submitted.

The Justice attorneys still must present evidence of IBM's alleged anticompetitive actions against leasing firms and some statistics on the peripherals market.

The peripherals witnesses have been the slowest part of the case. The first three all told parts of the Memorex story. James Guzy, a former executive vice-president of Memorex, was on the stand for eight days that stretched from Nov. 15 to Jan. 3 [CW, Nov. 29].

The next two, Thomas Gardner [CW, Feb. 28] and John Navas [CW, Feb. 21], both engineers who are now working with the Memorex litigation support group, were on the stand for 11 days each stretched out over a month.

Testimony by the Memorex witnesses, particularly Gardner, detailed the steps taken by IBM to offer new products with changes that in each case made it difficult and expensive for Memorex to bring out a

*(Continued on Page 4)*

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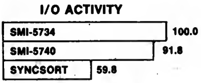

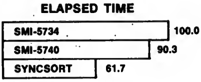

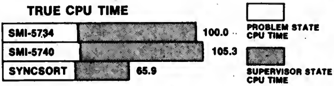

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# Job Market: DPers Worth More Than They Think

*(Continued from Page 1)*

"Wang is expanding and so is everyone; we've just eaten up the market," Theda McGrath, vice-president of Wang personnel, said. "From a recruitment point of view, the industry is in sad shape. We're just not getting the people."

In addition to newly created positions opening up, there is always movement within and between companies, Austin noted. Managers are "doing everything to keep their staffs but locking them in the closet," he said, adding the shops are making counter-offers like crazy.

There isn't a place that hasn't lost someone, to Digital Equipment Corp., Data General or some other large company, he said.

"But the large-scale user is still an IBM shop and [its] main source of talent is to go out and steal [it] from somebody else," Austin said.

In order to attract employees, salaries have increased dramatically.

Programmers and analysts with one to four years of experience are most in demand and their salaries range from $14,000 to $20,000, depending on experience.

There is a "critical need" for these people, but not much movement in the $20,000 bracket, Cohen said.

Since salaries are so closely competitive, companies are hoping to attract people by offering more of a "total compensation picture," according to Gary Villella, senior personnel representative for Pertec Computer Corp.

Career growth, employee benefits and company atmosphere are being promoted as actively as salary.

In one recent CW ad, a company even offered its proximity to the Rocky Mountains as an inducement to employment.

But people sometimes are reluctant to move to different areas because of housing shortages and high prices, Villella said.

Some have blamed the personnel shortage on the cutback in personnel training during the recession of the early '70s. At that time, training programs were cut out of budgets first, so now there are fewer trained DP personnel around than are needed, Austin said.

But even in this seller's market, trainees are finding it difficult to get jobs. Companies continue to look for someone with at least a year's experience.

### School-Developed Trainees

Some schools are developing good trainees — especially those who have instituted cooperative work programs with local computer centers, Wang's McGrath said. But most employers feel training programs don't equip people for work in an actual installation.

Computer science graduates are geared for the software development marketplace and are "inhaled" by the DECs and DGs, Austin said.

Also, the schools are controlled by the vendors, he contended. If they have IBM or DEC equipment, that's the kind of people they're graduating, he said.

Some industry people feel, however, that if the current trend continues, the market will be forced to turn to trainees to fill the empty positions.

The amazing thing is that a certain section of the industry still doesn't realize the swing-around that has occurred, according to Ausitn.

"Some of these programmers are lost in a little corner and have no idea of their market value. It's great to see the surprise that comes across their faces when they find out their present going rate," he said.

On the other hand, some employers aren't willing to face what's happened and they don't know how to hire anymore, he said.

Several people believe the male-female hiring ratio is evening up. It's much more equal on a technical level although it's still light on the management level, Austin said.

There are shops with more female programmers than males, he noted.

Most industry people feel they will have to adjust to the changes in the employment market and look forward, alheit with mixed feelings, to the seller's market continuing for several years.

# Bell Bill Seen Locking Out Users

*(Continued from Page 1)*

are other organizations that can make meaningful and important contributions in some aspects of communications service," he said.

According to Van Deerlin, the computer has assumed a dual role. "Not only is it the source of and destination for communications traffic. It has become an integral part of the communications system itself. So it is that the latest generation of telephone company central offices are computers.

"In short, the computer is emerging as a communications technology as well as a data processing technology with an inevitable blurring of the old distinctions."

Van Deerlin said he is "well aware that the question of what is communications and what is data processing is a mighty touchy subject in some company. I think you will agree with me that the boundary between the two becomes everyday more uncertain and more controversial."

Referring to the work of his subcommittee in drafting a new version of the Communications Act of 1934, Van Deerlin said "the long painful process of congressional policymaking has begun. The recent competition in telecommunications was fostered by a new level of sophistication introduced by the user, and Congress must now work to resolve the issues raised by procompetitive actions of the Federal Communications Commission."

The telephone industry has come to Congress for a new national communications policy. Once this policy is established, the telephone industry will apply itself to "fulfilling whatever role is given it," he predicted.

In the meantime, he urged users to contact their congressmen in order to be sure the user viewpoint is represented and understood by the legislators.

# U.S. vs. IBM Trial Progressing Slowly

*(Continued from Page 2)*

compatible product. If the actions they described are considered "predatory," the testimony could be damaging to IBM, sources said.

The issue in this case is not whether IBM's actions were illegal in and of themselves, but whether they were taken to block entry into the various segments of the computer market.

Consequently, each of the three was subjected to lengthy cross-examination by IBM attorney Thomas D. Barr. Judge David N. Edelstein sometimes lost patience with Barr and variously accused him of being a "bad boy," a "spoiled brat" and of abusing the purpose of cross-examination "time and time again."

This portion of the case also has seen a continued deterioration of relations between attorneys for the two parties, symbolized hy the affidavit lead government attorney Raymond Carlson filed last month in connection with an Itel Corp. motion [CW, Feb. 21].

In it, Carlson accused Barr of attempting to threaten Gardner and generally intimidating government witnesses.

IBM attorneys have their own gripes. They have admonished the Justice attorneys for not cooperating with them in preparing the order of documents IBM offered into evidence or in identifying the documents used during Navas' cross-examination. The government's defense in Navas' case was that the documents weren't relevant anyway.

This is the atmosphere in which Lawrence Spitters, Memorex founder and former chairman of the board, took the stand last week as the last Memorex witness.

After him, two witnesses are scheduled from the Bank of America, both of whose testimony Boote predicted will be fairly brief. Following them will be three witnesses from Storage Technology Corp., two from California Computer Products, Inc. and three from add-on memory makers.

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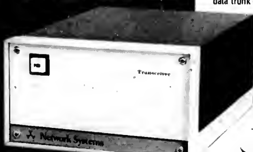

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|---|---|---|---|---|---|---|---|---|---|---|
| Price | $34,400 | $27,900 ($30,400)* | $34,000 | $34,830 | $31,500 | $35,300 | $27,900 | $39,000 | $31,995 | $27,700 |
| Memory (Bytes) | 24K | 60K | 32K | 16K | 16K | 20K | 32K | 32K | 48K | 16K |
| Disk (Bytes) | 5M | 4.6M | 7.5M | 5M | 5M | 5M | 6M | 10M | 5M | 5M |
| Printer (Char./Sec) | 165 | 60 | 180 | 120 | 120 | 130 | 160 | 165 | 200 | 120 |
| Industry-Oriented Applications? | Yes (5) | Yes (9) | No | Yes (20) | No* | Yes (160) | No | Packaged Turnkey System for Distributors | Yes (3) | Yes (8) |
| Monthly Rental or Lease | $757* | $736** | Yes* | $970* | No | No | $642* | $858* | $711* | $637* |
| Monthly Maintenance | $240 | $155 | $210 | $175 | $225 | $217* | $210 | $325 | $175 | $238 |
| Software Support | Vendor | Vendor | Vendor | Vendor | Vendor and Dealer | Vendor | Vendor | Vendor | Vendor | Vendor or Software Dealer |
| Maintenance Support | Sorbus | Vendor | Vendor | Vendor | Vendor | Vendor | Vendor, Distributor or Third Party | Vendor | Vendor | Vendor |
| Programming Support | Software Dealer | Optional From Vendor | OEM/Distributors | Via Initial Training and Documentation | Dealer | Vendor or Outside Sources | Distributor | Vendor | "Programmerless" System | Software Dealer |
| Comments | *5-Year third-party lease/purchase plan. | *B80 operating software is unbundled. The second number represents the cost with the operating system.<br>**Three-Year Lease. | *Lease plans available through DEC leasing, an independent company. | *Rental | *Applications available from dealers. | *$2,600/year | *Third-party lease | *66-month third-party lease. Ultimacc is based on a Data General Nova CPU. Price includes application software. | *Not including maintenance for five-year lease | *Five-year third party lease. |

A smattering of the small business systems designed for first-time users is represented on the above chart, which shows features, prices and support for the systems.

## Small Business Systems — Part 2

# Dizzying Array of Alternatives Face First-Time User

**By Esther Surden**
Of the CW Staff

First-time computer users, with their lack of DP knowledge and fear of computers, are being offered dizzying alternatives by system vendors.

Industry spokesmen estimate there are 80 to 120 vendors with units claimed to be small business systems. Each of these vendors offers a varying combination of hardware, software, support and service options.

Undoubtedly some vendors considered in that voluminous count offer systems designed for the more sophisticated user — systems in the performance range of the IBM 3 rather than the IBM 32 — which are not suited to first-time use. But a good number of systems were specifically designed for the first-time user.

Exactly what do these systems offer to the novice user? *Computerworld* took a look at 10 of them — a random sample — and what we found is shown on the accompanying chart.

In general, small business systems are available from four types of vendors: mainframers, small business computer makers, minicomputer manufacturers and turnkey system vendors.

### Mainframers Active

Mainframers have been very active recently with the introduction last year of the B80 from Burroughs Corp. and the recent announcement by Univac of the BC/7 to join IBM's well-established 32. NCR Corp. has also offered the first-time user an alternative with its 499 system.

The mainframers claim an advantage in servicing the user because they take responsibility for maintenance and system software support.

Small business computer makers like Basic/Four Corp., Wang Laboratories, Inc. and Qantel have traditionally made their wares available to the first-time user, but offer various plans for support and service.

The minicomputer makers also offer a mixed bag to users. On the one hand, the largest, Digital Equipment Corp., makes its minicomputer-based system available through distributors as a specially designed business system. On the other hand, it sells the mini to systems houses that add some kind of value to it and sell it to the first-time user.

Many minicomputer makers choose not to deal with the first-time user directly, but rather through distributors or turnkey system vendors.

Microdata Corp., another minicomputer maker, offers its Reality through a network of dealers, so the user interfaces with the dealer rather than the mini maker.

The turnkey vendors, represented on the chart by STC Systems, Inc., offer the first-time user a complete package of hardware and software or systems customized for business applications.

Rental or lease plans are available directly from three of the mainframers — IBM, Burroughs and Univac. Basic/Four, DEC, Qantel, STC and Wang will help users set up third-party leases.

The NCR 499 is a purchase-only system, according to a spokesman for that firm, and the Microdata Reality II is sold through dealers, so lease arrangements are on an individual basis, Microdata said.

### Software Support

With the exception of Microdata and Wang, all of the vendors represented on the chart offer operating software support exclusively through their own organizations. For users of the Wang and Microdata systems, the first resort in the case of an operating system problem is the dealer.

Backup software support is available from technical personnel located at vendor headquarters, those firms noted.

For the most part, vendors handle system maintenance themselves. Basic/Four and Qantel are the exceptions. Basic/Four uses Sorbus, an independent service company which also happens to be a subsidiary of MAI, Basic/Four's parent company.

Qantel offers maintenance through either the vendor, distributor or a third party depending on the user's location in relation to its service organization, a spokesman said.

Most of the vendors offer users some choice of canned industry-oriented applications packages. For example, a spokesman from NCR said that firm supplies 160 batch-oriented applications, and IBM said it can provide 20 "modules" of programs tailored to particular industries.

*Last week* Computerworld *took a look at a random sample of small business systems. This week, in the concluding article of this two-part series, we'll take a look at another random sample — small business systems for users with little or no DP expertise.*

Only DEC, Microdata and Qantel said they do not offer any industry-oriented applications programs directly. DEC noted its general application package can be tailored across the board to users in different industries.

Microdata's dealers sometimes offer individual industry application packages, a Microdata spokesman stated.

The biggest variation between the systems exists at the programming support level, with many vendors taking a different approach to dealing with users who are not DP-oriented.

For example, both IBM and Univac said their users are capable of operating the system themselves with no further programming help once they have been supplied with initial documentation and IBM's industry-oriented applications or Univac's user-oriented language.

On the other hand, both Burroughs and NCR acknowledged that programming help for their systems might be needed and said the user has the option of obtaining assistance from the vendor or an outside source.

DEC and Microdata offer programming help to adapt their systems to the user's needs through distributors or dealers. Basic/Four, Qantel and Wang also go that route, with Basic/Four and Wang directing users to a software dealer. Qantel's users deal through the distributor for applications software guidance.

The turnkey system vendor, of course, offers applications programming for a specific industry as part of the packaged cost of the system.

# Novice DPers Warned to Beware of Vendor Reps

TORONTO — The manufacturer's sales representative can be one of the biggest stumbling blocks to discovering which system has the required designed-in capacity to do the first-time user's job, according to an article in a recent "I.P. Sharp Newsletter."

Published here by the systems house of the same name, the article said a sales representative tends to claim his processor is the best of all possible solutions.

Sales reps place too much emphasis on finding out how much money the user has in the budget and not enough on the applications requirements, author Hugh O'Rourke explained.

"I think part of the problem here is lack of training . . . The fantastic growth of the minicomputer industry is often blamed for poor quality of service — the demand far outstrips the supply of qualified people.

"The same is true of the sales area, and the phrase 'I don't know, but I'll get back to you' is heard too frequently," he continued.

"Aside from the disturbing technical shallowness, I am suspicious that the salesman will get together with the boys in the back room...to find some way of answering the question that will keep the customer happy without flagrantly misrepresenting the product," he added.

Vendor literature, O'Rourke said, isn't much help for the user. Although user manuals should be the "ultimate source of information," they seldom live up to expectations: "They are often poorly organized and occasionally contain outright misrepresentations," he contended.

Users have to get manuals in order to properly evaluate systems, but this can be a monumental task, he said.

In the realm of software, the quality of the implementation of various languages "varies widely from mini to mini...The deficiencies of a given language implementation can always be circumvented," O'Rourke noted, "but this escalates programming costs and, over the life of most systems, more money will be spent on software than on hardware and maintenance."

### Processor Selection

Users should pay particular attention to processor selection, O'Rourke warned. If the vendor thinks cost is a big issue, he may try to lower the total price by suggesting a smaller processor and/or less memory.

But a user with too little memory wastes disk transfer time because a lot of swapping and/or overlaying becomes necessary. And because memory is relatively cheap, "there is no excuse for not buying a lot, particularly if [a user plans on having] on-line terminals," he advised.

Finally, he warned, the "danger in buying inexpensive hardware is that it will likely prove relatively expensive to program and maintain."

The newsletter is available free from I.P. Sharp at Suite 1400, York Centre, 145 King St. West, Toronto, Ont. M5H 1J8, Canada.

# DPMA Opening D.C. Office

PARK RIDGE, Ill. — The Data Processing Management Association (DPMA) is setting up an operation in Washington, D.C., to provide opinion, testimony or counsel on proposed legislation affecting the information-processing industry and profession.

George R. Eggert, the association's international vice-president for industry and government relations, has offered this service to all members of the U.S. Senate and House of Representatives, the DPMA said.

In support of the project, a communications network of DPMA members will be established to monitor all legislative programs at the federal, state and local levels of interest to DPMA members. Information developed will be printed and distributed through some means yet to be determined, the organization said.

# Ruling Affirmed: No Tax on Software

TALLAHASSEE, Fla. — Gov. Reubin O. Askew and the Florida Cabinet have affirmed and finalized the ruling issued in Nova Computing Services, Inc.'s administrative hearing that software is not taxable [CW, Jan. 17].

A final order of the Department of Revenue, approved by Askew and the Cabinet, stated that Florida Statute Chapter 212, which provides for taxation on sales, use and other transactions, "does not authorize tax on the intangible property which constitutes computer software."

The tax exemption applies to both custom and packaged software, according to Bob Sherin, president of Nova. Sherin conducted Nova's case using the state's Administrative Procedures Act rather than through the courts.

However, the ruling does have the force of the law, Sherin noted.

In the case, Nova fought not only a $26,225.67 assessment in sales tax on software sold between January 1973 and Nov. 30, 1975, but also the principle of law.

## Copyright or Patent?

# Software's 'Dual Nature' Seen Protection Problem

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Problems arise over the protection of software because programs fit neither copyright nor patent laws, according to Robert Nimtz, an attorney with Bell Telephone Laboratories and a member of an international association dedicated to protecting intellectual property.

The "dual nature of software" lies at the root of this trouble, Nimtz told a meeting of the Computer Law Association here last week.

Because it embodies the flow of algorithms and ideas, software seems best protected by the patent system, the attorney said.

On the other hand, programs also consist of identifiable code that does participate in commerce, can be sold and stolen and can be used without comprehension as to how it was written — all areas traditionally covered by the copyright laws, he added.

With patentable and copyrightable elements, computer programs are different from other entities governed by those laws, Nimtz maintained.

The author of software sees its value in its use — in the actual execution of the code — and not in whether someone copies it, he said. Any kind of registry of programs will not only be very expensive, but will go unused because it won't provide the kind of protection the programmer or software designer wants, Nimtz stated.

### Register Suspended

Nimtz's organization is the World Intellectual Property Organization (Wipo). Associated with the United Nations, Wipo is specifically concerned with copyright and international protection of computer software, as part of its overall goal to protect intellectual property, Nimtz explained.

The organization recently suspended consideration of an international register for software because it would be very expensive to maintain and because commercial agencies are already publishing abstracts of programs — a major function of any register.

Wipo has, however, continued to devote attention to drafting a model national law to govern the protection of software (see story on Page 60).

This law would define computer programs, cover only original work and classify unauthorized use, and not merely copying, as an infringement of the author's rights, Nimtz said.

Scheduled to be completed in draft form by June, this proposed model law is as far as Wipo can go given the state of the technology and of legal scholarship, he stated.

As with the copyright protection for software being considered by the National Commission on New Technological Uses of Copyrighted Works (see Page 1), Wipo's model law would not protect the concepts and algorithms contained in the programs, Nimtz said.

# Copyrights Rather Than Patents Urged for Software Protection

*(Continued from Page 1)*

copyrighted, he stated.

Where programs are original, where they are "fixed in a tangible medium of expression" — be it source language written by a programmer or the object code which drives the machine — they satisfy the definition of copyrightable material, Keplinger suggested.

Whatever Contu ultimately recommends to Congress in this area, the resulting copyright law must not be bound to a particular technology — like today's conception of software, he stressed.

Keplinger noted some changes might have to be made in the requirement that copyright material be "deposited" either with the Library of Congress or with a register dealing with a given subject.

The Subcommittee on Software prefers to have information deposited that identifies the program rather than the program itself, he said.

Contu's Subcommittee on Data Bases will probably make a similar recommendation.

Because commercially available data bases are so large and are updated so often, it would be unreasonable for the copyright laws to require that two copies be deposited every time they are changed, Contu attorney Christopher A. Meyer told the CLA.

Meyer noted data bases need not be computerized and have long been considered "compilations," therefore making them eligible for copyright protection.

He said he doubts Contu will have to make any other special recommendation to Congress regarding them.

The format and organization of a data base would be protected under the copyright law. Individual items contained in the data base may or may not be copyrightable, he said.

Data bases fit much more easily into the copyright law than do computer programs, Meyer stated. Copyrighted material contained in computer systems will still have the "fair use" protection found in the old 1907 copyright law and in common law.

Unauthorized copying of an entire data base would be an infringement of copyright law, Meyer said. However, he noted, automated data bases have inherent structural characteristics — like the fact they are accessed by parts at a time and are updated monthly if not daily — thus making them difficult to steal.

The commission knows little about works generated by computer applications, according to Jeffrey L. Squires, another Contu attorney.

The subcommittee has talked to computer music and graphics people who argue the resulting piece is as much theirs as it is the computer they use.

"There is much to recommend this assertion of authorship," Squires noted.

But if a computer is used to produce art or any copyrightable work, is the result art or copyrightable? Squires asked.

The answer to this question may depend on the extent to which the computer is involved in the final product. Perhaps this factor will become an important measure in trying to determine whether a particular computer output is copyrightable.

The U.S. Copyright Office currently registers works resulting from computer applications, but only where it is asserted that the end product required "substantial" human effort, Squires explained.

Congressional efforts to revise the copyright law began in the '50s, but it wasn't until 1967 that the House and Senate realized the impact of technological uses of copyrighted materials would have to be dealt with, Levine told the CLA.

Contu — the result of that concern — was signed into law on Dec. 31, 1974 by President Gerald R. Ford.

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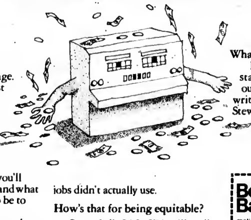

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# Bell Sees Tax Reform Act Stymieing Crime Detection

**By Nancy French**
Of the CW Staff

WASHINGTON, D.C. — Justice Department officials fear privacy provisions in the Tax Reform Act of 1976 will hinder investigation of white-collar crime and be costly to implement, according to Attorney General Griffin B. Bell.

On the recommendation of the House Ways and Means Committee's Oversight Subcommittee, the department's lawyers are drafting legislation to resolve the problems caused by the new law and have agreed to submit their draft to the subcommittee by the end of the month, according to Archie Parnell of the subcommittee staff.

Bell's investigators specifically object to privacy safeguards contained in the law which limit government investigators and prosecutors from obtaining information about individuals from the data banks of third-party recordkeepers such as banks and even the Internal Revenue Service.

Over the years, such information has helped federal investigators prove violations of tax and other nontax-related laws.

Many have found such use of personal records to be objectionable and, as a result, use of these records has now been limited.

Section 1205 of the Tax Reform Act of 1976 gives the taxpayer the right to be notified if an investigator is subpoenaing his records from a third party — as well as the right to halt the recordkeeper's production of the records. It also requires the government to bring an enforcement action in which he may intervene.

Bell told the subcommittee members at a recent hearing that given this right, the taxpayer can delay an investigation so long that it becomes impractical to continue some types of investigations.

Further, he added, the result could be a "substantial" loss of revenue to the U.S. government.

## Bad Timing

Another section of the law — Section 1202 — was designed to protect the privacy of tax returns and return information by prohibiting their disclosure except in specific circumstances.

It does allow disclosure of taxpayer records to attorneys of the Department of Justice under some conditions but, in the case of nontax matters, the law authorizes disclosure only by a court order after evidence has shown a crime has been committed.

This could hardly have come at a worse time, Bell said.

Given the backlog of about 38,000 cases in the district courts, it sometimes takes several months to get a hearing in a summons enforcement matter and it can take as long as two years to get a final decision, Bell said.

Also, the law is not clear on when tax information can be disclosed and what constitutes disclosure.

The law makes it a felony, punishable by five years in prison and a fine of up to $5,000 or both, to disclose tax information.

In addition, civil and punitive damages may be brought against any individual for both negligent and knowing disclosure.

Justice Department litigators are concerned that they may be harassed by suits for civil damages by taxpayers using civil action as a delaying tactic — a situation Bell said could seriously jeopardize criminal prosecution.

The Attorney General recommended the law be changed so banks or other third-party recordkeepers would not be liable to an individual as a result of complying with a summons for records.

But all testimony presented to the subcommittee on the matter did not support Bell's views.

Notably, a letter written by David Linowes, chairman of the Privacy Protection Study Commission, to Al Ullman, chairman of the Ways and Means Committee, pointed out that the law goes along with the commission's recommendations on limiting access to tax records, published last year.

Therefore, Linowes said he hopes Congress will not act precipitously to amend the law.

Identifiable taxpayer information should not be considered a generalized government asset, he said.

Given the fact substantial harm can come to an individual as a consequence of the enforcement of nontax law, the commission believes no use should be permitted unless "a compelling societal interest can be shown to outweigh the arguments against disclosure."

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# Firms Agree to Refund Unclaimed Customer Credits

**By Nancy French**
Of the CW Staff

WASHINGTON, D.C. — Two department store chains, one oil company and two entertainment credit card firms have settled out of court the charges of mishandling customers' unclaimed credit balances leveled against them by the Federal Trade Commission (FTC).

The FTC made the determination after a recent round of investigations that showed the firms usually wrote off and took as income unclaimed credit balances if customers did not ask for them or apply them against the purchase of new merchandise.

In most cases, the customers never knew they were losing money, according to Hong Dea, FTC assistant director of special statutes.

The FTC settled the matter out of court to avoid the cost of litigation, he added.

Although the companies agreed to generate refunds amounting to about $4 million in credit balances of $1 or more, they did not admit to any violation of the law.

The companies involved are Carte Blanche, part of Avco Financial Services, Inc.; Diners Club, a subsidiary of Continental Corp.; Atlantic Richfield Co.; Federated Department Stores, Inc.; and City Stores Co.

Calls to DP managers involved either were not returned or brought no answers on how the firms would comply. However, a retail industry consultant with expertise in DP explained that in most cases the notices and refunds would pose no problems.

Most retailers' DP departments maintain customer credit balances, even in inactive accounts, in their active accounts receivable system.

In cases where credit balances are actually written off and taken as income by the firms, an audit trail is prepared for the credit manager. Recreating these lists of customers to generate notices, statements or checks would be a relatively simple matter, he said.

The charges against the five firms were the result of the second round of FTC investigations undertaken after a number of consumer complaints on the subject.

Last year, at the end of round one, four major department store chains refunded more than $3.5 million to about 200,000 customers as a result of a similar consent agreement.

Genesco, Inc. of Nashville, one of the firms accused at that time, chose to litigate and lost, according to Dea.

Most of the firms have already taken some action, in part as a result of the Fair Credit Billing Act which superseded parts of the consent agreement — particularly in its requirement for notices of credit balances to customers, Dea said.

To assure compliance, the firms must supply the FTC with printouts listing names of the customers who received checks settling their accounts. Stores that fail to comply are subject to a $10,000 fine per violation.

# Simulation of Deer Kill Stirs Controversy Over Wolves' Status

**By Ann Dooley**
Of the CW Staff

FORT COLLINS, Colo. — The results of a simulation study showing hypothetical trends of deer killed by wolves has stirred some controversy among conservationists.

One group believes wolves should be reclassified from "endangered" to "threatened," which would relax restrictions on controlling wolf numbers; another believes the manually compiled statistics sent to the computer center here were misleading.

The federal computer center of the U.S. Fish and Wildlife Service, which ran the simulation, contends a wide range of variations were run to show the possibility — not necessarily the probability — of future trends, according to John Bartholow, assistant analyst at the Fish and Wildlife computer center.

The simulation was done at the request of the Minnesota Department of Natural Resources (DNR) for the Superior National Forest region on a Control Data Corp. 6400 time-sharing system at the University of Colorado at Boulder.

The data, compiled manually by the DNR and sent to the computer center, consisted of information on white-tailed deer population trends, sex ratio trends, the number of animals taken in legal harvest, the relative age, class and sizes of animals and an estimate of the magnitude of the deer population.

Statistics on wolf population size and the number of deer killed by wolves annually were also taken into account and the past behavior of wolf-deer relationships were simulated.

It was estimated that one wolf kills 18 deer annually if deer are its only prey. Since this is unlikely, the estimate would be closer to 15 deer annually, according to Dave Meech of the Minnesota Fish and Wildlife Service, who is also active in the Wolf Recovery Plan.

The simulation was done in order to give a range of options to decision makers, Bartholow said.

"One projection indicated that by 1985 nearly all deer would be destroyed by wolves and natural causes, even if hunting had been stopped in 1975," he said.

But to consider this one projection as an inevitability is just overreacting, he said.

The computer center will be running a second simulation at the request of Meech, who is challenging the initial input data put together by the Minnesota DNR. Using his statistics, they will then compare the differences, if any, in the simulations before any action will be taken.

## ACM Publishes Roster Of 1977 Membership

NEW YORK — The 1977 roster of the Association for Computing Machinery's (ACM) 35,000 members as of Jan. 1 is now available.

The list is both alphabetical and geographical and can be ordered from ACM's Order Department, P.O. Box 12105, Church St. Station, New York, N.Y. 10249.

Prepaid prices are $7 for ACM members and $25 to nonmembers.

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# National Archives Seeks Medium for Permanent Storage

**By Esther Surden**
Of the CW Staff

SAN FRANCISCO — The National Archives has a problem.

That problem is how to permanently store 200,000 reels of magnetic tape suspected of containing records of archival value. and then make their contents available not only to the public but to government agencies.

The tape medium does not fit the bill, however, because it is erasable, has a short shelf life and is subject to environment changes, according to Charles M. Dollar, who heads the archives' Machine-Readable Archives Division.

So Dollar asked the designers attending the IEEE Computer Society's Spring Compcon 77 Conference to come up with another medium for his application.

The Machine-Readable Archives Division grew out of a small group chartered in 1969 to develop a way to handle the growing number of machine-readable records being created by federal computer systems, he explained.

Presently, the archives has only 1,600 reels of tapes, but estimates indicate the volume of tapes should double every 15 years.

The archives also suspects agencies now hold 200,000 reels that will belong to it eventually, Dollar noted.

When computer people say "archival storage they mean inactive storage, but we mean permanent storage," Dollar said. "We are concerned with preserving records that will be used in the 21st and 22nd centuries.

"We want a storage medium that does not require special handling, is not subject to loss through system malfunction and does not need a special environment," he stated.

"Right now, we have a tape vault with one person monitoring the environment. But what the archives wants is a medium it can handle in the sume way it handles a book," he added.

With the explosion in the number of tapes, the archives will not be able to afford to keep a controlled environment, Dollar said.

The archives does not presently clean or handle the tapes in any way except when necessary, he noted.

"We are not concerned about rapid access time; we are content with being able to find the right reels. And if we go to another medium, we'll feel we've done a good job if we get the requested material back in two weeks," Dollar stated.

### Media Standardization

The archives would like to see media standardization, which would allow it to exchange data on archival media with other archives, and would like machine independence so as not to be locked into a particular configuration, Dollar said.

"Archival storage should have a high packing density, simply to reduce the amount of space required," Dollar said. The archives keeps a backup copy of the tapes and has determined that 200K char./in. would be a good density for them.

"For us, the bottom line is how much it costs." The device should be about $100,000 and the storage medium should cost less than two cents per megabyte, he said.

"Our concern is more than economics. We are also concerned about going with a medium that would be commercially obsolete," he said.

The archives examined 6250 char./in. tape, the IBM 3850 and Ampex Corp. Terabit memory, 300M-byte disk and magnetic bubbles and determined that none of these could meet its special storage needs.

Despite the fact that the IBM and Ampex memories have high packing densities, they have high costs and are machine dependent, the archivist said.

Disk packs meet only one of the criteria — machine independence. Disks are also too costly for this kind of storage and also are not permanent media.

"Bubble memory" is still in the developmental stage. But it would appear that although the packing density would be high enough, the cost per megabyte would be too high, he said.

One medium that the archives plans to look at carefully when it is fully developed is video disks, Dollar noted, urging rapid movement in this area.

# TI's Shepherd to Give NCC Keynote Address

DALLAS — Mark Shepherd Jr., chairman and chief executive officer of Texas Instruments, Inc., will deliver the keynote address at this year's National Computer Conference (NCC) here.

The keynote will open the show Monday morning, June 13. The exhibition and technical program is sponsored annually by the American Federation of Information Processing Societies, Inc. (Afips).

A major theme of Shepherd's remarks will be the extension of distributed computing into applications that were not predicted when the computer revolution began about 25 years ago.

Representing a company that was among the first to produce silicon transistors, invent and pioneer development of the integrated circuit and continue to work on today's most complex microcircuits and systems, Shepherd is uniquely qualified to assess the impact, implications and trends associated with present-day computing, according to NCC Chairman Dr. Portia Jackson.

Shepherd has been TI's president and chief operating officer since 1967.

# MSU DP Team Wins National Competition

ATLANTA — A bunch of bright students from Michigan State University won national honors in a 17-team computer programming competition here recently.

With their adviser, Richard J. Reid, professor of computer science, five team members flew to the competition at the Georgia Institute of Technology campus here, worked on computer problems for seven hours and returned as victors to MSU.

Four programming problems were handled by the teams. One involved unscrambling of persons' names, another dealt with a mathematical problem of amicable integers, a third shifted numbers between Arabic and Roman numerals and the fourth involved the cumulative scoring for a series of bowling games.

Team members included James Picard, Westland, Mich.; Dale Nickels, Hayward, Wis.; Mike Slattery, Elmwood Park, Ill.; Robin Beer, Coraopolis, Pa.; and David Knight of Lansing, Mich.

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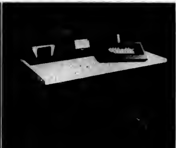
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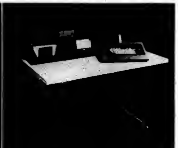
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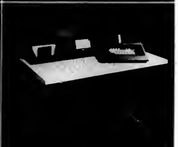
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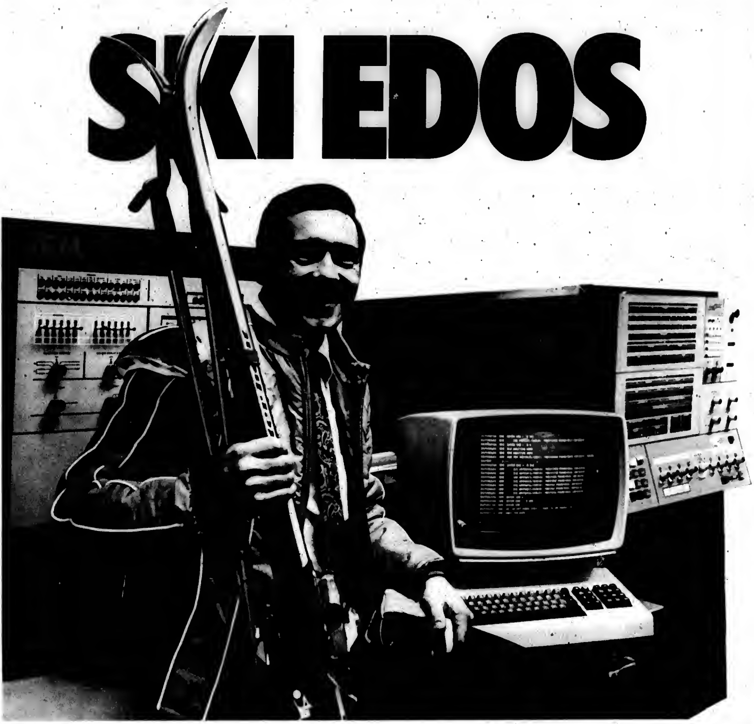

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# Dismissal of Calcomp vs. IBM: Act of Courage? Case of Rape?

By Edith Holmes
Of the CW Staff

LOS ANGELES — Was it a "courageous" move or a "rape" of the system? Depends which side you're on . . .

The trial of California Computer Products, Inc.'s antitrust case against IBM covered 11,000 pages of transcript, 500 exhibits, 48 depositions and 11 live witnesses before U.S. District Court Judge, Ray McNichols took the suit out of the hands of the jury by directing a verdict in favor of IBM here last month [CW, Feb. 21].

The reaction of the courtroom combatants and of the industry as a whole to McNichols' decision was surprise. In the week's following the suit's dismissal, the lead attorneys for Calcomp and IBM formed their own opinions about the justice of and the reasons behind the ruling.

Lauding McNichols' "sense of responsibility and courage" in deciding Calcomp's case lacked sufficient evidence that IBM was or is a monopolist, lead IBM counsel David Boies said the "easy way" would have been to let the case go to the jury.

### 'We Got Raped'

But Calcomp's lawyer, Maxwell M. Blecher, doesn't quite see it that way. Repeatedly assured by the judge that IBM's motion for dismissal was perfunctory, he didn't understand McNichols' remark, delivered along with his ruling, that "for some time prior to the commencement of this trial, I held the view that [Calcomp] had, at best, a very thin case for antitrust relief."

If the judge thought Calcomp lacked the necessary evidence from the beginning, he should have said so then, Blecher indicated.

"Sour grapes? You bet. We got raped," the attorney said.

Boies, who is a partner with Craveth, Swaine & Moore, agreed that while "everybody would have liked to have seen the case go all the way, the judge's ruling, from a practical viewpoint, was by far the best way for it to end."

It is now a matter of law that there is no antitrust violation on IBM's part. Five out of six federal judges have now come to this same conclusion in private antitrust suits against the mainframer, Boies pointed out.

If the Ninth Circuit Court of Appeals, to which Calcomp has appealed the McNichols decision, agrees with this majority, the IBM attorney expects the other cases brought against the corporation by companies on the West Coast will be disposed of eventually.

McNichols will clearly not try the suits brought by Memorex, Transamerica, Forro Precision Instruments and others, in Blecher's view. "A new judge would have to free up his schedule for a trial that would last between six and eight months," he said, adding that such an effort would not be easy.

"The antitrust laws — and the concept that we ought to promote competition — are not out of date. Competition provides both efficiency and customer satisfaction and nothing matches it," Boies stated.

The law is general, however, he added. It has "no intrinsic meaning" other than a declaration of policy that the competitive price system provides "the central nervous system of the economy," Boies suggested.

The problem comes with the specifics involved in proving monopoly, the IBM attorney continued. The law doesn't talk about the size of a corporation as a factor in determining antitrust violations.

### Alternatives for Users

Do users in the computer industry have product alternatives? "Hell, yes," Boies said. Can a small company compete effectively in the industry? "If Calcomp were to keep growing in all of its businesses the way it did in the manufacture of disk products, by 1981 it would be larger than Exxon," he noted.

Antitrust laws demand that every industry be examined on the basis of the facts involved, Boies maintained, adding that the problem in Calcomp vs. IBM was really with the facts.

"Max Blecher was stuck with certain facts — like the use of the Fixed Term Plan by everyone else before IBM ever introduced it and a statement by Calcomp Chairman Lester Kilpatrick to a group of security analysts in 1971 that if IBM hadn't dropped its prices, it would have lost its position," Boies said.

Blecher, on the other hand, believes the facts show IBM to be a traditional monopolist, holding back technological innovations — like the voice coil actuator available as early as 1967 but not introduced until 1971 — until it suited the corporation's best interests to bring them out.

"Antitrust is alright so long as it doesn't hurt anybody," the Calcomp attorney argued, stating that today there is no commitment in the U.S. to the concept of competition.

Instead of ruling on the legal aspects of antitrust cases, judges tend to look at the industry and at the size of the corporation accused of monopoly and end up making national policy. After all, there's the stock market and the national economy to consider, he said.

"Bringing an antitrust suit against IBM becomes analogous to throwing a rock into a pond," the lawyer said.

Until the U.S. government antitrust case against the mainframer, now at trial, is finished, there isn't a single lawsuit that could not be brought on the basis of IBM actions in the '60s and early '70s, the attorney contended.

### Change In Standard

McNichol's decision bothers Blecher, in part, because it suggests the standard for proving predatory actions in an industry will become "below-cost pricing" rather than "limited pricing." Such a change would damage the antitrust laws, in Blecher's opinion.

Transamerica believes it can prove IBM priced certain products below what it cost to produce them in order to maintain a dominant position in the marketplace, Blecher noted. While he thinks that's fine, the attorney doesn't believe it should be necessary.

All that is necessary is to show that IBM dropped its prices to achieve a lower level of "acceptable" profits once competition nipped at its heels, he indicated.

McNichols was described by both parties as "nervous" when he delivered the directed verdict in IBM's favor on Feb. 11. Blecher doesn't believe that the judge is firmly convinced he's right, but that he "has decided the best and fastest way to find out is to go to the circuit court."

*(Continued on Page 13)*

## Computer Found Innocent In Case of Water Bill

HENRIETTA, N.Y. — When a small-town resident receives a computerized water bill for $4,604, his first reaction is usually to blame the computer.

In the case of Bruce and Louise Hoffere here, the Burroughs Corp. L9000 series system used by the town was not the culprit.

"It's the same old story — garbage in, garbage out," replied a spokesman when asked about the billing. "The computer is only as smart as the information you give it.

"If you give it idiotic information, you will get idiotic billings. I've never had a real problem with the L9000 since it's been here."

The Hoffere's bill has been adjusted downward by $4,600 and city workers here are being a little more careful about the data they're entering into the computer these days.

### But 'I'm a Businessman': Kilpatrick

# Calcomp Disclaims Rumors of Settlement With IBM

**By Edith Holmes**
Of the CW Staff

LOS ANGELES — There is no truth to the rumors that California Computer Products, Inc. will settle its antitrust suit against IBM, according to Lester Kilpatrick, Calcomp's chief executive officer.

In an interview here recently, Kilpatrick said "emotionally" speaking he would like to see the suit go all the way through the judicial system. But, he added, "I've always admitted that IBM has enough money to convince me to forget the whole thing. I'm a businessman."

Judge Ray McNichols issued a directed verdict here recently ruling that Calcomp had presented insufficient evidence of antitrust violations by IBM, bringing an end to the three-month trial [CW, Feb. 21]. Calcomp has appealed that decision to the Ninth Circuit Court of Appeals.

Kilpatrick's telephone hasn't been "ringing off the wall" with settlement offers, however. While some observers contend the logical course for IBM to follow is to settle the suit while it's ahead and before the federal appellate court reviews the U.S. District Court record, Kilpatrick maintains "IBM feels too good at the moment" to entertain such a possibility seriously.

Like his firm's attorney, Maxwell M. Blecher, Kilpatrick has no fear of the counterclaim IBM has filed against Calcomp charging theft of trade secrets.

While Blecher and Kilpatrick were gratified by McNichols' decision not to hear the trade secrets case until the appeal has been argued before the Ninth Circuit, their desire to postpone this trial is based on Calcomp's limited resources for litigation.

He pointed out that Calcomp would have been willing to have IBM's counterclaim tried before its antitrust suit came into the courtroom, but IBM objected to this procedure.

Referring to Calcomp's antitrust case, Kilpatrick said, "I think we had a valid and true case — a righteous case — to work with."

He anticipates that none of the other West Coast antitrust cases against IBM will be tried until the Calcomp appeal is decided.

While Kilpatrick sees "every reason why Transamerica, Memorex and others would want to go forward," he believes these companies will end up with a judge other than McNichols to hear their suits.

"A new judge means delay, and it will be difficult to find a judge who will hear the cases prior to a decision on Calcomp," Kilpatrick stated.

### New York Crucial

The Calcomp officer feels all the West Coast plaintiffs will win their suits against IBM if the U.S. government, now engaged in a trial against the corporation in New York City, succeeds in convincing Judge David N. Edelstein that IBM is a monopolist.

If the Justice Department loses that case, all the other private antitrust suits against the mainframer will be lost as well, Kilpatrick said.

A settlement of U.S. vs. IBM is always a possibility, he added, noting the government is taking "an inordinately long time to put its case before the judge." The record in that case is filled with "great redundancy" and "complete detail," Kilpatrick said.

But the Justice Department is putting "an extremely strong case in the record," he added. And the government has additional credibility in that it "appears to have no ax to grind" against IBM as some private companies might, he said.

# Trial Outcome: Act of Courage? Case of Rape?

*(Continued from Page 12)*

McNichols may have looked at decisions by other judges on the matter of IBM and decided "Who am I to decide differently?" Blecher also suggested.

Some clarification of the law on the side of companies like Calcomp is needed; the reversal of the Telex case by the Tenth Circuit Court of Appeals set the only really recent precedent in antitrust suits of this kind and it overturned years of decisions which preceded it, Blecher said.

What would IBM's defense have looked like if it had been permitted to present its interpretation of the facts to the jury? Boies said it would have mirrored the defense in Telex vs. IBM where the corporation called to the stand a number of users, economists and IBM executives.

About 80 witnesses were planned for Calcomp, half of them to actually appear in court, and at least a dozen would have been users of IBM or Calcomp equipment.

Blecher said he, too, would have put users from Burroughs, Univac and United Airlines in the witness box during his rebuttal to IBM's defense. He didn't want to put any witnesses from other peripheral companies on the stand during Calcomp's direct case because he felt they would damage it.

Many of these companies — Telex, Memorex and Greyhound — "raped IBM of its engineering talent" at one time or another, and Blecher feared they would have a demoralizing effect on the jury in terms of Calcomp's legitimacy.

Unlike its colleagues in the peripherals business, Calcomp never had a key engineer come from IBM, Blecher said.

### Dangling Sword

On the other hand, Blecher wondered how many people and companies IBM will be able to sue for stealing the plans for the 3330 disk drive. In all, IBM has accused Information Storage Systems, Inc. (ISS), Telex, Memorex, Forro and Calcomp of spiriting these plans out of its labs. The two ISS men who actually took them in the first place were tried and jailed for the offense, he added.

The Calcomp attorney contended that "anyone who has the temerity to sue IBM gets the same counterclaim of trade secret theft. It is the sword over everyone's head."

How many times can the original theft be tried? And what entitles IBM to charge monopoly profits until these copycats come along? Blecher asked.

Boies' one big disappointment in the case was the severance of the trade secret counterclaim from the antitrust charges. The IBM attorney, who maintains "we have them cold," is eager to try the trade secrets suit now.

Blecher, however, believes the counterclaim is a ploy and is confident Calcomp can easily be defended against these charges.

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# I/O Standard Advocates Cite More Hardware Options

*The X3 committee af the American Natianal Standards Institute (Ansi) recently voted 33-8 in favor of letting out far public review the proposed standard an channel-level I/O interface [CW, Feb. 21].*

*The motion was opposed by all representatives from mainframe and minicomputer vendors except IBM, as well as two user groups. IBM, hawever, indicated na commitment to approve the proposal as a standard.*

Computerworld *interviewed representatives from thase who didn't want to advance the proposal for public review as well as those who did. Many stressed, hawever, that should the proposal reach a final vote, the head count cauld well be more evenly divided.*

By **Molly Upton**
Of the CW Staff

Advocates of putting the American National Standards Institute's (Ansi) I/O channel interface standard out for public review foresee such benefits from the standard as peripheral interchangeability and possibly more freedom in choosing mainframes.

Some respondents from the consumer and general interest groups on Ansi's X3 committee discounted manufacturers' objections that such a standard would inhibit technology (see Page 15).

One remarked Control Data Corp. and IBM are still using the interfaces they developed in the mid-'60s; another observed that England has an interface standard and doesn't seem to be harmed by its existence.

Furthermore, none of the mainframers offered an alternative interface, he observed. However, such a standard could put other mainframers at a disadvantage in benchmarks, he conceded, "but that doesn't negate the fact a standard is necessary."

Dr. Wallace R. McPherson Jr., director of the standards program at the Department of Health, Education and Welfare (HEW), said HEW's feeling is that it is a "badly needed standard." The lack of such a standard has caused many problems, he said, and having this specification would allow peripheral interchangeability.

All the recommendations he's had lead him to believe HEW will vote for the standard in the future as well, he added.

But other representatives of consumer groups on the X3 committee are not yet sure how they will vote in the future.

Pat Skelly, a representative of the Association for Computing Machinery's standards committee, said he needs more feedback from that committee, which is going to examine more closely the negative comments filed with X3.

George Theis, representing the National Association of State Information Systems (Nasis), voted to put the proposal out for review because he thinks a standard interface is appropriate and should result in increased efficiency and lower cost of systems.

Most of the Nasis members are IBM shops, so they already have the benefit of the de facto standard, he noted.

William Madison of the Association of Time Sharing Users doubts the standard will be implemented even if approved because he believes manufacturers probably are not going to comply.

"Unless a way can be found that avoids dictating a system's architecture, I don't think manufacturers are going to be able to adhere to an I/O interface standard," he said.

The public comments received during the review period will probably send the proposal back to the drawing board, he added, but if an interface standard could be produced and made workable, it "would be the greatest thing since bottled beer."

James Rizzolo, who represents the American Library Association, said that consumer group feel "the standard is an idea whose time has been here a while.

"You can put a Sears battery in a General Motors car, and this gives us the ability to do the same," he said.

Rizzolo, too, has to await further instructions from the group on how to vote in the future.

Richard E. Ricketts of the Life Office Management Association said he believes the standard will be good for competition and discounted the opposing manufacturers' arguments that the standard will hold back development.

Manufacturers such as IBM and CDC have been using the same interface schemes since about 1964, he pointed out.

Ricketts said manufacturers are probably unaware of the bidding opportunities they miss because users who expand their systems prefer to keep the same brand of peripherals in order to preserve the same types of file structures. The standard would provide users with the opportunity to not only replace peripherals with those of another manufacturer, but also to more easily swap mainframes, he said.

Ron Derby, manager of long-range planning at California Computer Products, Inc., was in favor of the standard being sent out for review because he thinks there ought to be a defined I/O port so small companies can be competitive.

One Ansi X3 member said he voted to put the standard out for review, but his action by no means guaranteed he will vote for the standard in the future.

He wants the document disseminated so people will realize it is in fact an IBM document, he said. "From a standards point of view, it would be a constraint of trade," he contended.

People should know what was "attempted to be perpetrated." The products of his firm would not be affected by the standard.

Barry S. White Jr. of the National Bureau of Standards (NBS) voted affirmatively on the motion and said there currently is no basis for not voting affirmatively to make the proposal a standard.

However, the NBS' position is open, pending review of the comments to both Ansi and the NBS, which has proposed the same interface as a Federal Information Processing Standard (Fips) [CW, March 7].

The NBS will share the comments it receives on the proposed Fips with Ansi.

In the long run, the Ansi and federal standards could be different, he said.

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## *Also Seen Inhibiting Innovation*

# Vendors Hit Proposed Standard as 'Anticompetitive'

**By Molly Upton**
Of the CW Staff

Representatives of mainframe and minicomputer manufacturers on the American National Standards Institute's (Ansi) X3 committee labeled the proposed I/O channel interface standard "anticompetitive" and an inhibition to technological innovation.

If the proposal is adopted as a standard and made the prerequisite for federal procurement, several said, they will probably resort to a "black box" between the CPU and the controller. However, this could adversely affect performance, they added.

But — although unmentioned — a possible underlying cause of their objection to the proposed standard is the fear that interchangeability of peripherals among mainframes would result in reduced revenues.

Peripherals, not the CPU, are accounting for increasing portions of a system's installed value, according to International Data Corp., a market research firm.

Among the six mainframers and mini makers polled, Digital Equipment Corp. seemed the most unhappy with the prospect of the standard.

DEC's architecture is largely based on buses, not channels, and therein lies the problem, according to Dr. David Nelson, manager of advanced development.

Although the large DEC machines have a sort of channel equivalent, "DEC architecture is not well-suited for the adoption of a channel such as the IBM channel," he observed.

"DEC hasn't addressed the issue of what to do if the standard is adopted," he said.

Rather than using a de facto standard that is used by a mainframer, Nelson said he would prefer to see interface standards at the device or controller level.

"This would give users peripheral interchangeability without being overly suggestive of mainframe design," he said, and thus "would give all a fair chance."

### Timing Wrong

Tom McNamara, director of industry standards at Honeywell Information Systems, Inc., voted against putting the proposed standard out for review because "the channel-level interface is an area where there are still great dynamic architectural changes going on and we don't feel at this point in time we can get a standard that is generally acceptable."

HIS feels this is a "regressive type of standard." It doesn't seem to be in HIS' best interest to use development money to move backward rather than forward to faster and better systems with more throughput available with other kinds of interfaces, he indicated.

HIS is reviewing what acceptance of the standard will mean. It depends on how the standard is adopted, he added.

I/O interfaces have been under consideration as a standard for a long time. "Maybe that attests to the fact that it isn't a spot that's sort of gelled enough for standardization as yet," he observed.

Dick Mindlin, assistant vice-president of NCR Corp., called the proposed standard a "mockery" of the standards process. "It doesn't represent a consensus" and is "anticompetitive," he contended.

"I don't know why I have to worry this late in the game about changing my I/O interface to be compatible with IBM . . . This makes it a lot easier for IBM to stay in the business, as far as I'm concerned. They're there and we're not," Mindlin said.

Mindlin also feels the proposed standard is "a technical and economic barrier to implementation of innovative methods and providing the I/O function."

Standardization programs don't have to inhibit innovation since in most cases they shy away from standards that affect design, he said. Standards are usually for the interchange of information, in which case it's up to the manufacturer to decide how to implement them, he explained.

Univac was opposed to the proposal becoming one step closer to a standard because it will "inhibit future architecture," according to Marvin Bass, director of standards.

"Standardizing an I/O interface in the channel area is quite inappropriate as it . . . freezes a particular crucial part of systems architecture," he said.

The interface, which is now about 15 years old, will not be able to cope with some future peripherals, he said. If it is made a standard, Univac might have to alter its thinking on some of its forthcoming products, he noted.

A Control Data Corp. spokesman said that firm opposed sending the standard out for review because it feels the proposed standard represents obsolescent technology. "Because of changes in architecture, we feel the channel-level interface may not necessarily be relevant or identifiable."

An increasing amount of communication is performed on a CPU-to-CPU basis, for example, he said.

CDC's technological evaluation of the standard was that it is "complex, expensive and in some applications too slow."

But because of the large number of votes advocating advancement of the standard, CDC is taking another look at the interface as a probable requirement for doing business, he said.

Data General Corp.'s Art Lynch, marketing manager of I/O products and communications, said if the proposed standard were adopted and it became a condition for doing business, the firm would have to adapt its products.

But DG would do this without any disruption to the CPU architecture, possibly by using its Micronova as a black box between the peripheral and the CPU, he speculated.

A spokesman for IBM, the only vendor to vote for putting the proposed standard out for comment, said "IBM voted for public review of the proposed I/O interface standard because we felt that all interested parties should have the opportunity to comment on the document developed by the technical committee of X3.

"While we have reservations about the justification and overall usefulness of an I/O interface standard to the DP industry and its users, we are continuing to assess our position."

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## Offers Greater Advantages

# Users Urged to Consider Mini T/S Instead of Micros

**By Esther Surden**
Of the CW Staff

SAN FRANCISCO — Time-sharing with minicomputers can be a viable alternative to individual, personal-sized systems in any organization, according to a paper recently given by Brad Hamson of the Digital Systems Laboratory at MIT.

Hamson drew his conclusions from the laboratory's development of a time-sharing minicomputer system.

With the advent of the microprocessor-based personal computer, everyone "has a tendency to go a bit overboard," he told a group at the recent Spring Compcon 77. People think "we can let everybody run off with their own computer and we don't need a central computer."

Personal computers do have some advantages, he noted. They are inexpensive; the user has personal control over the unit — he can lock it in a closet if he wishes and restrict its use, somewhat like the family car; and they tend to be relatively simple to operate, he said.

In addition, with no other users on the system, a personal computer user doesn't have to worry that someone will try out a new program and bring down the system. The user also has unlimited time on the system, he said, while with time-sharing time is limited.

### Complex Disadvantages

Some disadvantages are more complex, Hamson said. Many micros have limited processing power, a possible problem for users needing complex numerical analysis. But "this is tending to go away as an objection as microprocessors become more powerful," he added.

A more serious disadvantage is the lack of suitable peripherals for these systems, a problem that stems from the high cost of the peripherals compared to the low cost of the system. Also, the software for the personal systems "tends to be on a very small scale," he said, and can be compared to the amount available for minicomputers in 1968.

The software may take longer to develop than with the minis, however, he warned. "If everyone has his own computer resource and runs off into his own corner to compute . . . it's more difficult to get users to share ideas, programs, data and documentation."

With an adequately designed time-sharing minicomputer system, an organization can get high throughput for the dollar and multiple use out of the machine, Hamson said.

Further, users have access to a variety of peripherals and the expense of the peripherals is not as high when it is spread over a number of users, he noted.

In addition, a "user community does exist," and depending on how the community is designed, programs as well as ideas can be shared.

The central system can serve as a point of uniformity, he stated. Every user only has to learn one system.

In addition, the development of a large software library can be seen because "it's easier to write good software for the mini" and people "don't have to reinvent the wheel."

### Objections to T/S

There have been many objections to the time-sharing minicomputer. Traditionally, the cost has been high and some systems were so costly that users had to buy time on an off-site system.

Time-sharing systems are "slow when they are loaded down, and if everyone tries to do a Fortran compile, the system goes down."

Reliability of the central system is another problem. If it goes down, all the users go down, too. And a lot have had "terrible human engineering and poor system administration," he said.

Most of the objections can be overcome, Hamson indicated, by selecting a minicomputer and using an appropriate operating system design.

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# DP Study Suggests Regulating Smog on Regional Basis

By **Ann Dooley**
Of the CW Staff

COLUMBUS, Ohio — Farmers in Maine can suffer the effects of New York City's pollution, according to a computer study on ozone transportation conducted by Battelle Laboratories here.

Ozone, a major component of smog, was tracked hundreds of miles downwind of large urban centers in both New England and the Midwest, according to Chet Spicer, associate manager of the Atmospheric Chemistry Group at Battelle.

The research projects showed it would be more effective to regulate pollution on a regional rather than a city-to-city basis, Spicer said.

In the New England study, researchers manually collected data on 15 different chemicals at ground-level sites and from samples taken by airplane at 1,000 feet for analysis by computer.

The data was collected in the form of basic voltage readings which were converted into numerical units and then put onto paper tape or magnetic disks.

The information was read by a series of computer programs and then loaded into the file system. Another program produced daily averages using standard statistical procedures and regression techniques, Spicer said.

Mapping and statistical information were entered into a Control Data Corp. 6400 system. A Cyber 73 Model 16, a California Computer Products, Inc. plotter and a CDC 1700 minicomputer linked to the Cyber 73 for three-dimensional graphics were also used, according to Fred Blakeslee, systems analyst.

An hourly value average of many chemical and meteorological variables were also recorded over a six-week period.

### Peak-Time Measuring

Ozone levels were measured in mid-afternoon — a time when ozone was expected to be highest — and a daily average was taken from 1 p.m. to midnight since ozone buildup may take 24 hours depending on the wind velocity, Blakeslee said.

The data from the readings was then entered into the system and, through regression analysis, prediction levels were forecast.

The studies found high-pressure weather systems can cause long-range travel of ozone, which may take several hours to build up.

Pollution levels twice that of Environmental Protection Agency (EPA) health standards were traced 250 miles downwind of Boston and over the Atlantic Ocean, Spicer said.

The study was undertaken to analyze present conditions and report to the EPA, which funded the project, so it might be able to correct any problems.

The modeling results have caused the EPA to consider protection alternatives. One idea is to set up a program to warn asthmatics or others with respiratory problems to stay indoors on days when high pollution levels are forecast, he said. Such a program is already operating in Los Angeles.

## Getting, Bayless Gain IEEE Nominations

NEW YORK — The board of directors of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) has nominated Dr. Ivan A. Getting for president and Carleton A. Bayless for executive vice-president of that organization.

Getting is president and a member of the board of trustees of the Aerospace Corp. in El Segundo, Calif. Bayless is Pacific Telephone and Telegraph Co.'s division manager for the State of California.

Bayless is currently serving as executive vice-president, having been a successful petition candidate.

## ACM Unit Sets Talks On Management of Data

COLUMBUS, Ohio — A one-day symposium on the management of data within current data base technology will be held May 13 at Battelle Laboratories here by the Association for Computing Machinery's (ACM) Central Ohio Chapter.

Conferences will discuss the theories of data management, data base technology and commercial data base products.

Information on the symposium is available from Dorothy Smith, E.S. Preston and Associates, 939 Goodale Blvd., Columbus, Ohio 43212.

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# Editorial

## *Will Micros Mean Business?*

The development of Cobol as a source language for several microcomputers from different suppliers has far-reaching implications.

Up to now, each user of a micro system was dependent on the software made available by the vendor of that system or on his own talents or those of various user groups. This was especially true for the business-oriented user who, in most cases, had to depend on applications issued by the supplier.

Now that a version of Cobol shows promise of being compatible with a wide range of micros [CW, Feb. 28], the user may get much needed flexibility. The potential ability of upgrading from one micro system to another without sacrificing previously developed software becomes an important advantage.

The bulk of micros have been used by the OEM-type customer who typically uses the processor in one specific application and has none of the traditional upgrade needs of the more conventional user.

But the low cost of the micro could allow users to replace the general-purpose minicomputers now in widespread use with these smaller systems.

Still, the micro as a general-purpose system has a way to go. A significant barrier yet to be overcome is the lack of general interfacing that will permit a variety of peripheral I/O devices to be used interchangeably among a range of micro systems.

There has been little impetus so far for interface standards because these machines are not yet in user situations. But the Cobol "cross-translator" is an important step in the right direction.

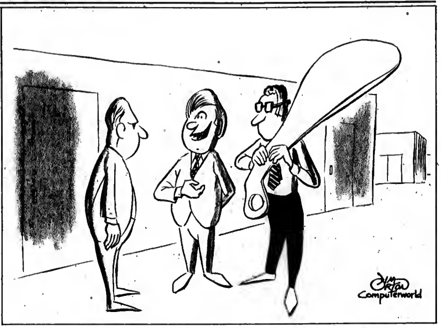
The technology/cost curve is continuing to plunge. And this lower cost is currently most dramatically expressed by micros. The potential savings associated with these smaller processors will not long escape the attention of innovative users and vendors alike.

The flexibility of existing business systems is tied to the ability of the user to write new software as his needs change. It will not be enough to offer a range of precoded firmware modules designed to fit the needs of the most popular applications.

There will always be in-house programmers determined to fine tune their applications. And general usage of Cobol is a step toward such a capability.

The general-purpose micro has great potential for performing DP operations in typical business situations. It is hard to predict how soon the remaining barriers will be overcome. The significant point is that the barriers are marketing-oriented only.

The technology exists to make these smaller systems available to a much wider spectrum of users. It may not happen tomorrow, but it is only a question of time.



*'Harkins Is the Lead Programmer on Our Microcomputer Cobol Project.'*

# Letters to the Editor

## Hobbyist's Do-It-Yourself Belief May Bring Forth Innovative Ideas

"The Human Connection" on hobbyist ["Home Hobbyist Requires 'Houseware,' 'Spouseware,'" CW, Feb. 28] and several industry comments about the hobbyists' market made me wonder if we're all not missing the point — personal computing enthusiasts take themselves seriously.

They really believe they can finally realize the age-old goal of "do it yourself" and accomplish miraculous things with their own computers.

There is reason to believe they are probably closer to the reality of the situation than we might be willing to admit. The availability of low-cost, easily interfaced microprocessor units combined with the enthusiasm of a hobbyist in any field can result in some very innovative ideas.

Yes, the typical revolutionary breakthrough in technology is more likely to come out of an R&D laboratory or research center than anywhere else. But it also seems apparent that the implementation of those revolutionary ideas and their practical application are just as likely to come out of a basement workshop or a hobbyist's head.

S. Michael Smith
Westchester, Ill.

## Vigilance, Opposition Essential Following Fla. Software Ruling

Let the Florida decision on the intangibility of software serve notice to the industry that vigilance and proper opposition are essential to the elimination of government interference outside its enumerated powers in the software sector.

Few software people, if any, took notice when, on Dec. 11, 1974, the Florida Department of Revenue promulgated rules with the force of law, taxing virtually all aspects of software as tangible personal property. Nor was any formal objection made when the rules taxing the software industry were applied retroactively three years prior to their enactment, including interest and a customary 25% penalty.

Two years after the rules taxing the software industry were promulgated, they were ordered struck down by an administrative court in the case of Nova Computing Services, Inc. vs. Reubin O. Askew et al.

In a landmark decision congruous with the Tennessee decision, the court ruled all software is intangible and beyond the reach of laws dealing with tangible personal property, essentially according the software industry professional status under Florida law.

The Florida cause was handled by me, representing the industry, through the Administrative Procedure Act (APA), which permits a party to represent himself or to be represented by other competent parties or attorneys.

It is my belief that the software issue can be won in all the states as it was in Florida. To that end, I offer my time free of charge to represent any party under the APA in any of the 50 states, providing out-of-pocket expenses are paid, in the challenge of a ruling or rule construing software to be tangible personal property.

Robert M. Sherin
President
Nova Computing Services, Inc.
Miami, Fla.

*(Other letters on Pages 20 and 22.)*

# Data Past

### Five Years Ago
### March 15, 1972

SAN FRANCISCO — A temporary restraining order requiring IBM to continue maintenance for users with extended memory equipment from Itel Corp. was extended until the end of the court proceeding in which Itel asked for a preliminary injunction barring IBM from withdrawing maintenance services.

— — —

WASHINGTON, D.C. — Sen. Sam J. Ervin (D-N.C.) reported computerized dossiers on "hundreds of thousands" of Americans "still existed" despite an Army order to have them destroyed.

A brief filed with the court in the case of Tatum vs. Laird urged the Supreme Court to order a lower court to hear a case challenging the constitutionality of Army surveillance and data bank operations.

### Eight Years Ago
### March 19, 1969

CUPERTINO, Calif.— Information Storage Systems, Inc. (ISS) announced a disk drive compatible with the IBM 2311, but twice as fast.

The average access time on the ISS 701 was 30 msec and the maximum was 60 msec. By contrast, the average access time of the IBM 2311 was 75 msec.

— — —

NEW YORK — The Association for Computing Machinery (ACM) dissolved its Special Interest Committee on the Social Implications of Computing (SICSIC) much to the surprise of its secretary, Robert M. Shapiro.

A protest letter written by Shapiro to ACM President Bernard C. Galler was also a surprise to ACM as there was no record that Shapiro was secretary.

Shapiro asked Galler to reinstate the committee. He also asked that the ACM council "make an effort to undo the impression created by the publicity about the dissolution of the group — an impression to the effect that computer people are not concerned with social or political issues."

# Survey Data Reveals Strong Bias in DP Management

**By Jack Stone**
Special to Computerworld

This week is the final installment of the survey on sex bias in DP centers that started last fall [CW, Oct. 4].

Previous columns in this series have included Martha Collaer's inspiring letter on personal initiative [CW, Dec. 6], a broad range of viewpoints [CW, Feb. 21] and an analysis of attitudes toward sex bias [CW, March 7].

In this column, I'll summarize survey results on the issues of the secretarial staff as a source of entry-level DP personnel and of women in management. Statistics on each subject will be followed by readers' comments and I'll close with an epilogue.

First, let's examine the question "Do you feel the secretarial staff is a viable source of personnel for junior DP positions?"

Of the 150 respondents who answered this question, 75 said yes and 75 said no, for an even split. Of those who said yes, 33 or 44% were men, 42 or 56% were women. The noes included 29 men and 46 women.

Of the people who said yes, 19 or 58% of the men and 30 or 71% of the women were college grads. Of those with negative views, 16 or 55% of the men and 31 or 68% of the women were grads.

Here are some comments on this subject from the readers:

- "Since our first computer was installed, we have always offered entry-level positions to other [non-DP] employees before attempting to fill them from the outside. We have successfully trained eight persons, seven of whom were female.

"Several of these employees have been repeatedly promoted within the department as their technical knowledge and expertise developed. I myself was a collector/supervisor in accounts receivable when I transferred [to DP] as a control clerk. I later became a programmer trainee, then a programmer and am now the director/manager."

- "From what I have seen and experienced, our organization is very good about working clerk-typists into operator and technician positions. The process is usually slow, but training opportunities are generally good and abundant.

"In my own case, I can't imagine where I could receive better training and advancement potential and get paid a full salary at the same time (I am in an upward mobility position)!"

- "I feel that secreterial staff would not be a viable source of programmers due to their lack of interest. However, if clerical staff indicated an interest, then why not? Since most secretaries are female, it could be one way to get more women into DP."

- "My position as program librarian is far more clerical/secretarial than technical. There are many, many technical duties that I have the ability, training and background to perform but, because of manpower shortages, budget restrictions, etc., [management is] hesitant to train me for a more technical, challenging, responsible position. I actually [don't have] more of a chance for advancing in DP than do the administrative secretaries in this organization."

Let's now look at survey results with regard to women in DP management. The survey form allowed respondents to enter the numbers of men and women in management (second level up) and in supervisory (first level) positions.

Within the installations represented by the 154 respondents, there were 1,293 managers and supervisors. Of this total, 1,081 or 84% were men. The group included 527 managers (478 or 91% were men) and 766 supervisors (603 or 79% were men).

I examined similar statistics for the installations for which respondents answered "yes" to the question "Do you feel your organization discriminates against women in the hiring, transfer, selection or promotion of DP positions?"

In this group, there were 675 managers and supervisors, of which 616 or 91% were men. The total group included 248 managers (239 or 96% were men) and 427 supervisors (377 or 88% were men).

Here are some comments from readers regarding women in DP management:

## The Human Connection

- "I have personally found that: women are somewhat suspect until they prove themselves; if a woman is determined she can get into management; a number of women refuse to accept "nonfemale" jobs and work at not succeeding; women often have to work at feelings of their own worth that come naturally to men.

"It takes extra inner strength to be different and to be an aggressive female."

- "I do not feel that this office could be accused, in the legal sense, of discrimination against women, but the fact remains all of our management and programming positions are held by men. Despite the Affirmative Action rules by which we operate, however, the old attitudes toward women prevail.

"I have had to fight against the feelings of some of our staff that I should do our secretary's job when she is absent, simply because I am a woman."

- "I feel all women have one right in business — the right to compete with men and other women for jobs. That is the only right I'm prepared to concede to women — or men."

- "The attached numbers are de facto evidence of discrimination. Nevertheless, younger members of the staff who have a high level of consciousness and concern for the problem are moving into positions of influence and evidencing more than lip service to Affirmative Action.

"In addition, my company has just begun a very strong new program of Affirmative Action for minorities and both professional DP jobs and management training.

"Older management continues to display a lack of understanding: "If we can't call them girls, what should we call them — boys?"

- "Three years ago there were no women in DP in my firm other than keypunch operators. I requested a transfer to operations and, after much opposition, the transfer came through. Then a woman programmer was hired and a librarian. Later, a female secretary joined us and another female operator. All of this occurred within one and a half years. Now I am being trained as a programmer.

"Many people's attitudes have changed considerably in the past three years. The men in the department were not too eager to work with me as an equal, but they have accepted me and the other women quite well.

"Now I see no opposition to any qualified and determined women below the management level. Breaking into management may prove quite difficult for a woman; there are no woman managers in my firm."

Some closing comments. First, I was very impressed with the seriousness and the articulation of the many notes and letters that accompanied the survey forms. This issue is deeply felt by many people, and I hope the comments I quoted properly represented the inner thoughts of the respondents.

Second, I was rather overwhelmed with the expressions of individuality of the readership. There was no discernible sexual partisanship.

Finally, I personally am chagrined. You see, the president of the small computer services firm to which Sandra Cunningham referred, in the original survey article, as being discriminatory toward women was me.

# Classification System Helps You Check Your Check Digits

Check digits have been with us for years and several new methods for creating check digits have recently been developed.

What has not been developed as yet is any method of pigeonholing the various systems.

## The Taylor Report

By
Alan Taylor, CDP

As a result, users have to be mathematicians, with time to investigate all of the systems or else they risk missing the advantages of having the check-digit system that fits their own operations.

Classification of check-digit systems is possible, however. In collaboration with Prof. Magdy Riskalla of Babson College in Wellesley, Mass., I recently helped develop a modest classification method.

This approach is based on gaining an understanding of three vital areas of consideration: the use of the system, the cause and frequency of system failure and the method of creating the check digit.

### Check-Digit Uses

Check digits are simply single numbers that get attached to other numbers. Potentially, a check digit can be developed for every mathematically possible number — such as for the million numbers between 0 and 999,999, if a six-digit number is to be controlled.

Practically, however, this is not so. Not all of the million possible numbers are to be controlled and, even if they are, the way that some of the controlled numbers are used more frequently than others can also be important.

In particular, where part of the controlled number is given over to codes for geographical areas, branches, etc., patterns of use and nonuse often can be seen — such as great use of branch 001 and absolutely no use of 999.

These items can wreck any calculation based upon some assumed random distribution of numbers, so anyone identifying a check-digit system should first define the area being investigated.

In the Riskalla/Taylor (RT) system, the only measurement currently suggested for measuring the area of use is simply what proportion of the theoretical maximum number is to be used. This is given as .5 if 500,000 numbers out of 1,000,000 were to be used, or .1 if only 100,000 of them were in use.

### Check-Digit Failures

Check-digit systems are not infallible; they have failures and different systems have different groups of failures. A second R/T classification area deals with failures that can be expected from any particular check-digit system.

Naturally, before we can classify failures, we have to identify failure families. The traditional methods of counting check-digit failures relate to how often they fail to catch some of the common types of human failure that occur in manual transliteration.

No separate consideration of mechanical or electronic failures during transmission of a number seems to have suggested any patterns in this more-modern situation, so we are still using the traditional breakdowns.

I don't think this loses anything, as the nonhuman types of failure appear to be random and are related to the human "single-digit error" type of failure.

The human errors break down into two elementary types: mistakes where a number is simply wrong (transliteration errors) and mistakes where two numbers are swapped (transposition errors).

Both of these errors can be measured by seeing what percentage of the possible wrong numbers would result from the error being made by the checking method.

The example given in our paper is a three-digit number — 125. If the operator makes a single mistake, he will come up with one of the following 27 numbers: 025, 225, 325, 425, 525, 625, 725, 825, 925, 105, 115, 135, 145, 155, 165, 175, 185, 195, 120, 121, 122, 123, 124, 126, 127, 128 and 129.

To find out how good the check-digit system is with the original number 125, we could check whether any of these would have the same check digit as the original number. Any of these numbers that have the same check digit as 125 would not be able to be caught and so must be considered as failures.

However, such a check would only give the details regarding the specific number 125 and, for example, could be totally wrong for 126.

To develop methods for handling the system as a whole, all the numbers to be controlled are checked, all the failures are counted and a percentage of transliteration (or transposition) failures is worked out. These are then used for the classification system measurements.

We now have three numbers: a universe number (i.e., 50%), a transliteration failure number (i.e., 13%) and a transposition failure number (i.e., 8%).

### System Description

The final category deals with the system of finding the check digit. This is not quite so mathematical because it is simply pigeonholing the development method.

Indeed, the first two of the three description groups are simply selecting from the four currently available types of check digits.

The four available types can be viewed by considering the development of check digits from the traditional systems. In these early systems, the check number is derived without using any code number from a series of values independnetly created by each individual digit in the system.

Modern systems can use code numbers and can code the whole number rather than having to deal separately and independently with each digit. Using these distinctions, classification is simple.

Systems are described as "positional" if they are traditional and regard the digits independently; or "contextual" if the whole number is used as a context. They are also called "stationary" if (as in the traditional method) there is no permutation code involved, or "dynamic," if the user can select his own permutation code and change it from time to time without having to change his system.

The final part of the description of the system deals with its "vulnerability." This is simply an estimate as to how much work would be involved in breaking the system from the outside. Class A systems require large-scale computers and specially selected sample input with which to work. Class B systems only require a small, almost random sample and could be achieved without computers. Class C systems only require a general understanding and no real effort, certainly no computer use.

So, now you have a classification system for check digits. I think we should have one and I would be glad to hear of any improvements.

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# To Be 'Professionals,' DPers Must Act Professionally

**By Willard C. Cole**
Special to Computerworld

For some time now, the furor over certification in data processing has been raging in *Computerworld*, and I've got to admit that I'm tired of it.

The rationale seems to be that certification is tantamount to professionalism. Nothing could be farther from the truth.

The fact of having passed a rather general test in order to become a certified data processor or a registered business programmer is pretty ludicrous because of the scope and diversity of applications which DP involves. To be certified as a business programmer or analyst proves absolutely nothing.

How can it when there are no standards for the industry as a whole?

A Certificate of Data Processing (CDP) after one's name is an entree in certain circles; in other circles, it means absolutely nothing. Having passed or failed a test doesn't reflect on one's ability or profesionalism.

Isn't professionalism more defined by a set of standards as to the methods used of practicing a chosen field of endeavor? Doctors, dentists and lawyers all pass tests on standard subjects in standard forms which can be proven or disproven, but there are unprofessional doctors and dentists, and some lawyers have proven themselves to be something less than professional although competent and certified.

What are the professional standards of our business? What ethics have we laid down? None. Even our professional nemeses, the accountants, have generally accepted accounting practices. What generally accepted programming practices do we have? What generally accepted systems practices do we have? None that I know of.

Even the hardware has a nonstandard architecture. How can we ask the public in general and our peers in other professions to accept us as professionals when we have none of the trappings of professionalism?

One of the first steps toward professionalism in our industry, it seems to me, would be certification of the schools which teach DP or, better yet, applied DP.

## Reader Commentary

Yet even here the pedagogues and the shirt-sleeve crowd are at one anther's throat over what is mundane and what is germane.

The sacred trust that we hold for the public is too important to be left to people who are too callous to care. We must affect the lives of at least 98% of the people in the U.S., and yet we are an unregulated industry. In that we are lucky.

We are rapidly approaching that point where we will be like doctors and lawyers and accountants — we will certainly have lawsuits leveled against us for misuse or misappropriation of data. When we use a Social Security number as an identifier, we are effectively breaking the law, but we aren't prosecuted for it. Soon we will be.

If we really are professionals, then we certainly owe it to the public to educate them as they wish and to let them know that we are an open conduit of information about our profession. Our profession is well stocked with hermits and monomaniacs, with people whose idea of a really charged-up conversation is a discussion of the intricacies of placing different memory chips in unique sequences.

This is what the public sees of us, this is what the public thinks of us. Is this what we are? I hope not.

Let us educate the public, actually communicate with those who are the beneficiaries of our wisdom. The American Federation of Information Processing Societies (Afips) has done a lousy job of educating the public, not to mention us as a profession.

We need a voice, and Afips should be that voice. If not, we can change Afips.

What we hold is truly a public trust because we are privileged to manipulate data regarding virtually every individual in this society. This data regards personal matters which should not otherwise be divulged, and it is our job to safeguard that data.

Therefore, if we are to remain professionals and retain the title, we must begin to conduct ourselves as professionals. It makes no difference whether professionalism is by dint of training or de facto because of work performed.

We must conduct ourselves as professionals both in attitude and in actual fact.

*Cole is DP manager at Edwards Baking Co. in Atlanta, Ga.*

## Letters to The Editor

### A Philosophical Difference

Maybe my skin is getting thinner as I get older, but I am moved to comment on what I feel is unwarranted criticism of one of Synergetics Corp.'s products.

Granted statements by Robert Becker ["Acquisition of Dictionary Insures Benefit of DBMS," CW, Feb. 28] are a user's views; however, they should have been placed in context.

Becker requested a trial installation of the Data Catalogue on Nov. 7, 1974 — more than two years ago.

The trial installation began on Dec. 15 of that year. It concluded on Jan. 17, 1975, when Becker informed us he liked the system and would recommend it for use at Foremost except the firm, being heavily involved in insuring mobile homes, was in the throes of budget cutting.

Since the introduction of Data Catalogue in 1974, we have continually enhanced the product. The package has a free-form, as well as fixed-form, input capability. The product also has an interactive inquiry capability.

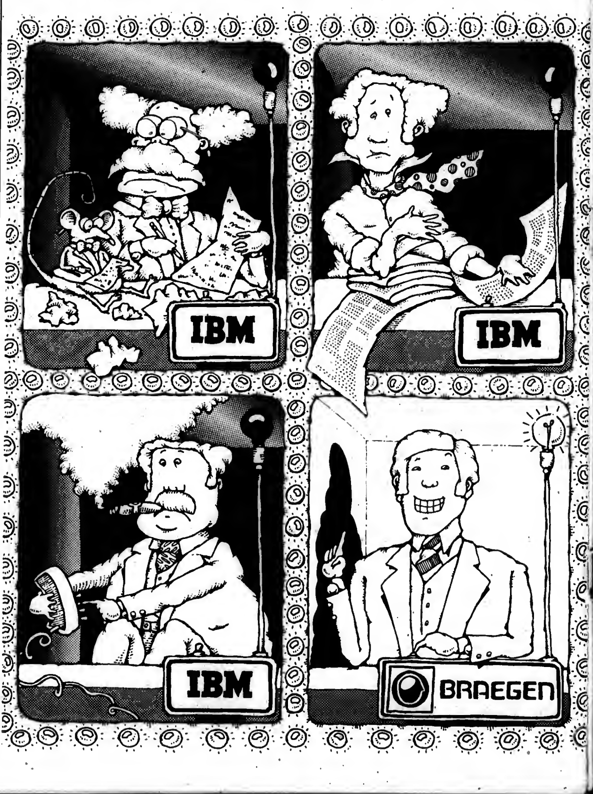
As to the cumbersomeness of the reports, we'll leave the judgment to our more than 60 Data Catalogue users around the world.

People's opinions differ; there are different philosophies as to the use of data dictionaries. Becker's philosophy differs from ours.

We feel that if a data dictionary is to be a cost-effective, analytical management tool, it must have both on-line and batch capabilities. Neither capability by itself provides the responsiveness and depth of information that is required by different users at different times.

Alexander R. DeVito
President

Synergetics Corp.
Bedford, Mass.



### Able to Organize, Create, Adapt

# 'Manager of Situations' Evolving as Successful Leader

**By James R. Kitchen**
Special to Computerworld

As a result of pressures from the constantly changing economic and social environment, DP management has undergone several changes since the early '50s.

If we are to seek out the qualities or characteristics of the good or successful manager, it is important to quickly scan the major trends or changes of thought.

Between the '50s and the mid '70s, management went through several phases. The most recognizable managerial styles that evolved fall into three distinct categories: the "management by pressure" type of the '50s and early '60s, the "manager of technicians" of the '60s and early '70s and the "manager of situations" of the '70s.

The period between 1953 and 1962 has often been characterized as the "age of the good-time goof-off." The economy of the nation was caught up inadvertently by the end of the Korean War and the rising inflation left over by the '40s. Cost/price squeezes resulted in the development of the "management by pressure."

### New Management Formula

The social and economic changes beginning in the mid '60s forced a new theory or formula of management. The formula became one of greater diversification and allowed for a creativity that had not been associated before with the responsibilities of a manager or executive.

This new style of manager is characterized as the "manager of technicians." This new formula for successful leadership features the philosophy that the creative manager or executive must simply adapt his own qualities to the particular problem and the cause and effects of that problem.

## Reader Commentary

The early '70s saw the evolution of a new dynamic manager, who is becoming known as the "manager of situations." The philosophy of this type of manager emphasizes and demands creativity and genuine harmonizing of his own, special, intimate qualities to the particular situation and to his associates.

Hopefully, he does not lose his own identity but, at the same time, he no longer sets the rules and rigidly casts the people into a mold.

There ceases to be an "executive" or "management" personality because successful management behavior is "situational," that is to say, related to the environment and to the followers, as well as to the leader's actions or personality.

He is mentally and emotionally committed to all tasks that lie within his responsibility.

### Sets the Pace

The manager of today goes to great length, coaching and developing his subordinates, at the same building a solid bond of trust and confidence. In so doing, he is able to set the pace of the department and, as the ripples of that pace move outward, it will have an effect on the entire organization.

As the saying goes, there are three types of people: those who make things happen, those who watch what is happening and those who don't know what has happened.

The new manager must be characterized as one who most certainly knows what is happening and, indeed, is one who helps make things happen. He is the brains and leadership in the drive to increase sales, develop new products, cut costs or improve and refine quality.

Because of this he will be more of a generalist than in the past styles of management. As a manager he must know that he will be facing problems that far transcend any specialty.

### Must be 'Bilingual'

While the specialist by nature is somewhat rigid, our manager must be more adaptable and flexible than a specialist could possibly be. He must be bilingual; that is to say, he must be able to speak to both the DP personnel and the users.

The new manager also must be an organizer. Modern business is so complex that task forces, management teams and sound organizations have become an inherent part of its very structure.

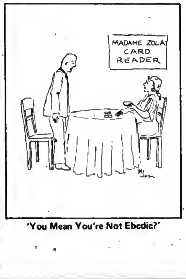
The very number of people involved, the specialization in some areas, the growth of pressure groups for special interests all will require the manager to have and to exercise exceptional organization skills. Of necessity, he will delegate more and more responsibility.

It would seem then that organization and generalization most certainly become necessary traits of the successful manager as well as the super-developed creativity.

The changing economic and social setting has had an effect upon styles of management. It brought into existence a decidely new type of manager.

The ability to organize, to get results and to adapt to the rapidly changing circumstances are the primary criteria for executive success today.

*Kitchen is currently with NCR in South Carolina.*



'You Mean You're Not Ebcdic?'

# IBM can't think of everything.

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*(*Division of The Incredible Systems and T-Shirt Company)*

# Letters to the Editor

## Measure Belittled, Results Ignored

In his letter ["Free Booklet Confirms Old Adage," CW, Feb. 28], Jim Buren criticized Auerbach Publications, Inc.'s booklet "54 Ways to Reduce DP Costs." In doing so, he indicated two things:

First, Buren doesn't appreciate the fact that the "54 ways" which he demeaned were the cost-cutting measures taken by over 180 users surveyed by Auerbach editors.

Second, while he belittled the measure of putting more than one record on a punched card, saying that programming costs would be excessive, he failed to calculate the results of such a measure.

The company involved saved about 80,000 cards per day, about 21 million cards per year or about $51,000 annually at current prices.

The booklet is still available from Auerbach.

Foster Brown
Project Editor
Auerbach Publishers, Inc.
Pennsauken, N.J.

## Bias Aids Job Security

Richard H. Dubois was correct in his letter about the bias of the "consultative" salesmen ["'Consultative' Salesmen Have Built-In Bias for Own Vendor," CW, Jan. 31].

Before I became a consultative salesman for IBM, I was a consultant for Booz-Allen & Hamilton. I now have my own consulting firm. In all three situations, I tried to give the customer the benefit of my knowledge of DP and computers.

The difference is that if I had attempted to recommend any equipment other than IBM's while working for IBM, I would soon not have been working for IBM. Clear?

Thomas L. Gerber
Aherdeen, S.D.

## Protesting Fatuity

I had hoped Richard J. Cichelli and Martha J. Cichelli would fade quietly away after their articles on Goal-Directed Programming [CW, Aug. 2, 16 and 30], but I see they were determined to "discover" the true source of the Nile ["Use of 'Trunks' Would Aid Programmer Productivity," CW, Feb. 21].

They should have asked the natives — any business systems house that's making money is reusing generalized programming. Any computer manufacturer's support staff uses the same "core" programming constantly. Ask Basic/Four Corp. or Datapoint Corp. how all those systems get installed so quickly.

And to claim originality for having designed a table-driven edit program . . . good grief. The claim is an original idea.

Next thing you know, they'll be dropping a note to *Communications of the Association for Computing Machinery* about "GOTOs Considered Harmful" — and we all know what a fight that would start.

Stop them, before it's too late.

Laurance F. Wygant
Schaumburg, Ill.

## DP Donations Needed

Among the readership of *Computerworld* there are probably some corporations that are willing to donate computer equipment to nonprofit institutions. Such a corporation is likely to think of universities and colleges, but rarely of institutions for mentally retarded people, such as the O'Berry Center.

Institutions for retarded people generate a tremendous mass of data — medical, psychological, demographic, clerical — and a computer is really needed to cope with this data mountain.

Since many retarded people have multiple problems, such as brain damage, sensory deficits and seizures, any equipment that could interface with an electroencephalograph/polygraph would be very useful.

Dr. William B. Turpin
Research Section
O'Berry Center
Goldboro, N.C.

*Computerworld* welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.

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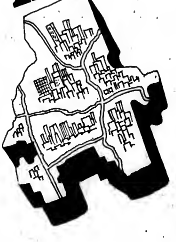

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### Human Factors Also Vital

# Project Confirms Impact of Programming Techniques

**By Don Leavitt**
Of the CW Staff

BETHESDA, Md. — Heavy use of advanced programming techniques will increase a development team's productivity — but factors beyond the control of the team may have an even more significant effect on its work, according to a report in the current issue of the *IBM Systems Journal*.

Written by Claude E. Walston and Charles Felix of IBM's Federal Systems Division, the article showed greater increases in productivity occur when user interfaces or user participation improve than when any particular programming technique is used more heavily.

Commenting on the data presented, Felix warned, however, that it represents only a first-level analysis of a data base that has been building up over four years.

It makes no attempt to show, for example, the combined impact of user-DP staff relations and programming techniques, although all the projects involved both user contacts and detailed design and coding work, he said.

Walston and Felix cast their article in terms of how they worked to develop a method for programming measurement and estimation.

They analyzed data collected at the Federal Systems Division representing 60 projects on which the division had consistent reports of what was accomplished with what resources and with what techniques.

The projects ranged widely in size and complexity. When time and effort in all the projects were tallied against volume of code generated, however, several patterns showed up.

If structured programming, for example, was used more than two-thirds of the time during project development, the mean productivity reached an average of 301 delivered source lines/man/month (DSL/MM).

When the same technique was used in no more than one-third of a project, the DSL/MM dropped to 169, the authors noted.

Yet the end users for whom the projects were being developed also had a substantial effect on how well the work developed. When the "customer interface" was less complex than normal — an admittedly subjective evaluation on the part of the DPers reporting their results — the DSL/MM reached 500. When the interface was more complex than normal, however, the productivity averaged no more than 124 DSL/MM, the report showed.

Based on that evidence, it appears heavy use of structured programming can increase productivity 77%, while easing the complexity of the interface with the user provides nearly a 4 to 1 improvement.

Unfortunately, Felix pointed out, the results reported cannot be interpreted quite that simply. Each of the average figures was developed from a questionnaire which listed all 29 variables being studied.

Thus, individual projects that used structured programming may have also used, for example, chief programmer teams, top-down development, structured walk-throughs as the coding was developed or any combination of these techniques.

The current *Journal* article does not attempt to track the impact of using multiple advanced techniques or of working under several of the measured conditions. Such regression analysis will be the next step in the authors' attempt to develop a method of measuring and estimating programming projects, they said.

The software measurements project began in 1972 with a desire to assess the effect of structured programming on the software development process. To do that, the researchers measured the then-current methodologies; from that base, they could determine the effect of introducing new methodologies.

Ultimately 29 variables were felt to have enough impact on the work being done to be worth isolating. The presence or absence of these factors was indicated on the same forms the developers used to report their progress, if any, through a project.

The 60 projects now completed and included in the data base "represent a wide variety of programming technology," the authors said. Delivered source lines ranged from 4,000 to 467,000 and the effort needed to produce them ranged from 12 to 11,758 man-months, they added.

Although the primary effort of the Walston/Felix study was directed toward productivity analysis, it also showed documentation is a critical product of every software project and documentation costs are an important component of the estimation process.

The authors also commented on the impact that changes in project duration and staff size can have on the attempt to estimate project costs accurately.

The *IBM Systems Journal* is published quarterly and is available for $6/year. Single copies cost $1.75 from IBM's corporate headquarters in Armonk, N.Y. 10504.

Reprints of the Walston/Felix study are available for 50 cents each from Data Processing and General Systems Division branch offices, a spokesman added.

# 'Nibl' Simplifies Use of SC/MP Microprocessor

SANTA CLARA, Calif. — Described as similar to Basic, the National Industrial Basic Language (Nihl) has been developed by National Semiconductor Corp. to make its 8-bit SC/MP microprocessor system easy to use by those untrained in electronics or computer programming, the company said.

Until now, a spokesman explained, most microprocessors — particularly at the low-cost end of the market — have been programmed in "almost cryptographic Assembly language." While the resulting code has been fast and efficient, it has also been hard to read, tedious to write and difficult to learn, he added.

With Nihl, on the other hand, the user trades high execution speed and memory efficiency for program readability, modifiability and rapid program generation, National Semi said.

Nihl is an adaptation of Tiny Basic which was developed by Robert Albrecht and Dennis Allison of Peoples Computer Co. in Menlo Park, Calif., as a general-purpose game and control language for microprocessors. To function on a range of micros, it was written interpretively in an "ideal language" designed for the construction of translators, the vendor added.

To adapt Tiny Basic's generalized capabilities to the SC/MP, National Semi created an interpreter that allows it to execute on its micro. Improvements in Tiny Basic's I/O and device control have also been designed and built in Nihl, the spokesman noted.

Nihl source programs are interpreted by a 4K-byte SC/MP program that resides in read-only memory (ROM). The interpreter is made up of two blocks: a program written in the intermediate language, which deciphers Nihl, and a collection of SC/MP machine language subroutines invoked by the intermediate language.

The minimum hardware required for implementing Nihl is the SC/MP CPU; crystal and support logic; 110 bit/sec Ascii terminal interface; 4K by 8 bits of ROM for Nihl; 2K by 8 bits of random-access memory user space; a teletypewriter terminal; and a 5V power supply.

That configuration would allow "about 60 average Nibl statements," the spokesman said. As an option, Nihl will support an additional 26K bytes of user memory, which would permit a total of nearly 1,200 lines of Nihl code.

The Nibl coding has been placed in the public domain and is available free, in paper tape format, through the newsletter of the National Semiconductor Microprocessors Users Group, the company said from 2900 Semiconductor Drive, Santa Clara, Calif. 95051.

# Update Eases Data Compression

WOODLAND HILLS, Calif. — Release 2.1 of the Shrink data compression/encryption system from Informatics, Inc. is said to improve throughput 20% compared with earlier releases and to provide users with a choice of techniques that can be applied to individual files.

The throughput improvement comes with the use of "standing" definitions of how a file is to be handled, the company said. Previously, the system had to gather this basic information each time it needed to work with a file.

While users now have several options for compressing/encrypting a file, the Huffman Encoding Technique from the earlier Shrink release is still available, serving as the default option.

Other than that, users can work with pattern recognition, a table-driven approach or with ones keyed to report values or record identification in a data base setting.

Shrink, which operates under IBM OS or OS/VS environments, requires 32K memory in the "real" setting. Distributed in object code, the package is available for $12,500 from Informatics, 21031 Ventura Blvd., Woodland Hills, Calif. 91364.

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# DBMS, Language, Applications Developed for Interdata Users

SAN DIEGO — A series of business-oriented application modules, a commercial programming language and a data base management system (DBMS), under which the language and the applications run, are available for Interdata, Inc. computer users from California Minicomputer Systems, Inc. (CMS).

The company's commercial reporting system includes modules for order entry, accounts receivable, accounts payable and general ledger, a spokesman noted, adding modules for cost control and material requirements planning are also part of the package.

The English-like programming language includes a library of macro instructions, each of which covers an operation common to commercial DP and enables the user to create modules for other application areas without doing all the coding himself, CMS said.

The DBMS, which operates as a task under Interdata's OS16MT2 or OS32MT environments, can be used for either batch or interactive work. It includes "fewer than a dozen" verbs providing file creation, retrieval, update and maintenance capabilities, the company claimed.

The system supports a record-oriented architecture providing record and file expansion facilities "structured to meet the needs of commercial programs," the spokesman explained.

### Oriented to Records

The DBMS also has a dynamic mapping feature to ease conversion from conventional file systems or other data bases.

The software fits into a 6K-byte partition, but is capable of servicing as many user partitions as available memory permits. It includes function checking routines and file password protection, he added.

### Separate Applications.

The DBMS and the programming language, as well as a customer file update routine, are available as a combined package for $4,500.

Individual application modules generally cost $1,000 or $1,500, a spokesman added.

CMS is at 8262 Clairemont Mesa Blvd., San Diego, Calif. 92111.

# 'JCL/Gen' Eases Move to OS

LYONS, Ill. — JCL/Gen, a program designed to generate the OS Job Control Language (JCL) statements required by the IBM DOS Emulator on the 370 systems, is now available from General Electronics.

The generator operates as a problem program under OS/MFT or MVT, the vendor said.

By easing the task of coding JCL, the package should make conversion to OS easier since it allows most DOS jobs to run under the emulator without any further change, General Electronics noted.

All output from JCL/Gen can be printed, punched or passed directly to an internal reader for processing. All generated JCL is unique, permitting "any number" of emulators to be run at the same time, a spokesman added.

JCL/Gen is passed information at run-time to establish the parameters required for a run including, for example, Sysres and Syslog addresses, partition sizes, DOS pack serial numbers and the drives on which they are expected.

The user can specify if DOS or OS is to handle space allocations, the spokesman said.

Users can also specify Hasp route instructions, OS message levels "and many other options. Most have defaults and need to be supplied only when necessary," he added.

In addition, the package extends features not normally available to the DOS programs, according to General Electronics.

The Assembler language source code of JCL/Gen is distributed for a one-time license cost of $2,000. On-site support is available on a per-day expense basis if needed, but normal installation takes less than an hour, General Electronics said.

The firm can be reached through P.O. Box 79, Lyons, Ill. 60534.

# Cobol Development and Upkeep Simplified With Use of 'SL1'

BLUE BELL, Pa. — Systems Language I (SL1) from Brown Associates is a Cobol precompiler that is said to combine the techniques of structured programming and the concepts of common data base definition to produce user-specific application programs.

The package provides a series of command statements and a file or data base parameter entry system that combine to create ANS Cobol source code.

SL1 is operational on various CPUs and produces Cobol that can be compiled and run on an even wider range, the vendor said.

Although a spokesman cited one case in which 15 SL1 statements generated 299 ANS Cobol statements, that appears to be exceptional.

More conservatively, he claimed an overall increase in productivity at a ratio of 3:1 "is not impractical."

While the detailed logic of each program created by SL1 is unique, the basic structures of the programs are all alike. This means, the vendor said, that integration of systems is easier since all the technicians are "operating in the same environment."

Maintenance is easier as well, the spokesman added. The structured approach provides the means of doing maintenance work without prior knowledge of the program or investigation of how it fits into a system.

Major changes can be made to a system as a whole instead of having to modify each individual program, he claimed.

The free-form input of SL1 can be used in 120K bytes under OS or 90K bytes under DOS on an IBM 370, or in 25K words on Univac 1100 series mainframes.

The generated Cobol can be compiled on IBM, Univac, Honeywell, Xerox Data Systems and Burroughs computers, the vendor added.

SL1 is available under a permanent license for $30,000 or under one-year and four-year payment plans requiring monthly fees of $2,750 and $915 respectively.

Brown Associates can be reached through P.O. Box 116, Blue Bell, Pa. 19422.

# 'Wip-Tide' Supports Data Entry on TI 742

EXCELSIOR, Minn. — W.W. Enterprises Improved Program for Texas Instruments Data Entry (Wip-Tide) runs on the TI Model 742 programmable terminal and allows a clerk to create and maintain a library of formats for use in data entry editing, according to the vendor.

Each format consists of a name and associated field specifications which describe a record of up to 85 characters.

Alphanumeric fields as well as constant data to be emitted into the record, duplicates repeated in multiple records and accumulators are supported by Wip-Tide, a spokesman explained.

### Two Basic Programs

Wip-Tide is made up of two basic programs for format maintenance and key entry editing operations.

The maintenance program permits field names up to nine characters long and two or three characters for each attribute within a field, he said.

Prompts are provided to help the operator during format generation and the program allows additions, deletions or changes as needed, including a facility to display field specifications of selected formats, he added.

The key entry support includes on-line loading of formats, display of three accumulators with or without clearing them and the display of diagnostic aids to assist the vendor in remote problem solving, should that become necessary, he said.

W.W. Enterprises is at 151 Second St., Excelsior, Minn. 55331.

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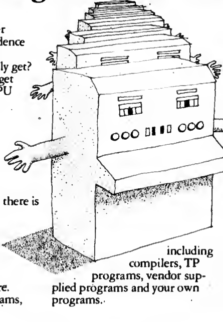

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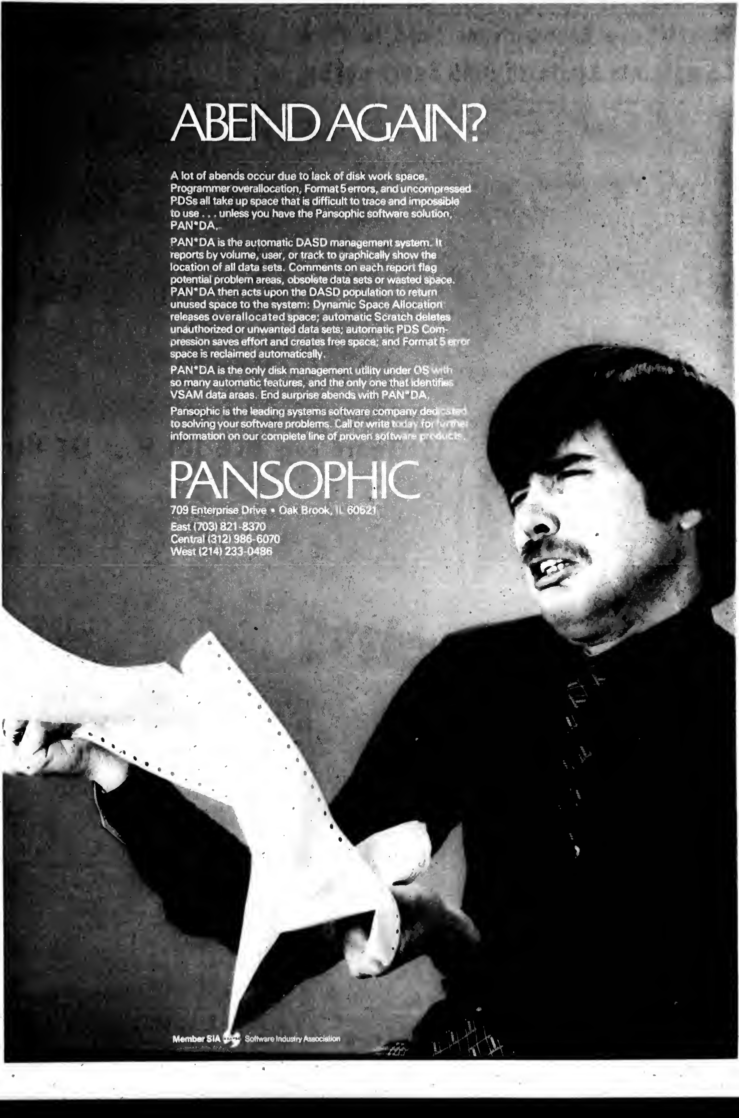

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# Worst-Case Assumptions Said to Flaw Complaints Against DBMS Benchmarks

**By Paul S. Darlaston**
Special to Computerworld

I take issue with various points made in Stephen L. Robinson's "Benchmarking Used Incorrectly for DBMS Evaluation" [CW, Feb. 14].

Robinson appeared to have made a number of worst-case assumptions in order to support his arguments. For example, the selection of a very important application would prove very little if that application did not require a representative range of organizations, access methods, etc.

The use of vendor resources can be an asset if controlled effectively. If the aim is to select the package with the best all-around performance, then each vendor should have equal opportunity to use his in-house expertise to tune his product.

### User's Interest

It is obviously in the potential user's interest to closely monitor both the implementation and the measured runs of the benchmarks.

In a comparative study of data base packages which I conducted two years ago, the test application which was chosen was well understood, so sound, logical representations of the data base requirements could be designed.

It was complex enough to test the flexibility of packages, but could be implemented in the short timeframe of the benchmark.

The benchmark consisted of a load, followed by several cycles of sequential extractions of data and random updating (including deletions) to highlight degradation. The data bases were then reorganized if degradation was significant.

## Data Basics

Where this was necessary, the time taken was applied through a formula to normalize the regular processing times. A further cycle of runs was then made to demonstrate any performance improvements resulting from reorganization.

### Dedicated Machine

The benchmarks were all run on a dedicated machine. The key measurements were CPU cycles, EXCPs or equivalent channel activity and elapsed time. These measurements were prorated to reflect the performance per dollar of the hardware utilized.

The different runs were prioritized and weighted to reflect importance in terms of frequency of running in the live environment. The vendors were informed of these priorities before they began implementation.

Finally, all benchmarks were supervised by our representatives and hardware and/or software monitors were used to verify results.

This all represented a long and costly study. Obviously, not every company could justify the necessary expenditure. In our case, the large volumes of data to be processed required a careful evaluation of the offerings in the marketplace.

It provided us with much significant information, not just on relative performance, but also on the level of support available and the ease of use of the respective packages.

In addition to the benchmarks themselves, we conducted a parallel exercise to evaluate the features offered with each package. These were also weighted to reflect our priorities.

Overall, we acquired a very clear picture of the strengths and limitations of the products offered. We could not have achieved this degree of clarity with a feature study alone.

Only a well-run benchmark can conclusively test the claims of a product marketing team.

*Darlaston is supervisor of data bases at Bell Canada.*

## Cobol-Using Minis Linked

WINTER PARK, Fla. — The Communications Link package from Information Processing, Inc. (IPI) was designed to let one minicomputer operating under IPI's Blis/Cobol environment communicate over telephone lines to another mini running in the same environment, a spokesman said.

With the package, files at the second mini can be opened, manipulated and closed through Cobol programming loaded and executing at the first site without interrupting the second user's on-line production, IPI claimed.

All message formatting, character manipulating, time-outs and retries are handled by the package at the driver level. Point-to-point communications can be synchronous or asynchronous, using RS-232 modems, the spokesman added.

The communications link uses Data General Corp. 4023, 4029, 4060 or 4070 controller boards (or comparable boards for the other minis on which Blis/Cobol can be used) or the DG ALM8 multiplexer. Communications can be half- or full-duplex — with or without modem control — and transmission speeds ranging from 110- to 9,600 bit/sec can be handled, he said.

The Communications Link package costs $2,000 plus $1,000 per site for installation, IPI said from 1850 Lee Road, Winter Park, Fla. 32789.

### *With Memo Posting, Log File*

# Software Lets NCR 101 Host EFT Net

DAYTON, Ohio — A software system that enables an NCR Century 101 to serve as the host CPU for an on-line network of electronic funds transfer (EFT) terminals while the user's main processing load is handled by a separate batch-oriented CPU has been introduced by NCR Corp.

By handling the on-line work on one CPU and the batch work on another, a user can move to on-line operations even if his mainframe — which need not be an NCR CPU — doesn't support such work directly, a spokesman explained.

With the EFT Applied System software in place, the 101 supports either NCR 279s or NCR 770s, he said.

EFT Applied System functions as a memo-posting operation; it does not do an on-line update of the customer's permanent file. But in terms of service to the customer or the clerk at the terminal, the distinction is transparent, he said.

The NCR software uses as input a magnetic tape file created by the batch-based system at the end of its processing runs. Data from this tape is stored on disk within the 101, where it serves as the basis for validating transactions as they come in from the terminals.

The disk file is updated so it is current for whatever comes next. At the same time, the system creates a log file of the transactions as they are received.

It is this log file, on magnetic tape, that is sent back to the batch machine each evening for posting to the customers' actual files, NCR said.

Creation of the tape going to the 101 is "no more than an afternoon's work," according to the spokesman, who said it is generated by "whatever run passes the master file after all processing is done" by the batch system.

NCR provides users with format specifications for that tape and for the log file that goes back to the mainframe, the company said.

EFT Applied System software runs under NCR's B2 on-line operating system which may be configured to support batch work along with the terminal support. NCR said the system requires at least 128K of main memory, two disk units, two tape drives and a multiplexer.

The software is subject to an initial charge of $50,000 and a monthly license fee of $250. It is available for immediate delivery, the spokesman noted.

## Free Guide Offered

PENNSAUKEN, N.J.— A free 16-page portfolio available from Auerbach Publishers, Inc. defines structured programming and shows how the technique can overcome some of the difficulties inherent in more traditional programming methods, a spokesman said.

"Objectives of Structured Programming" includes a section on elementary concepts with examples, he added from 6560 N. Park Drive, Pennsauken, N.J. 08109.

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# DP Dialogue

Notes and observations from IBM
which may prove of interest to
data processing professionals.

*Computer-controlled electric vehicle moves automatically to the selected aisle and bin, for storage and retrieval of goods in a main warehouse of VWR Scientific.*

## CICS/VS Helps Multiply Profits at VWR

"Controlling operations with an online system helped us multiply profit severalfold," says James W. Bernard, president of VWR Scientific Inc., one of the country's largest distributors of scientific and photographic supplies and equipment.

Over two years, he notes, the San Francisco headquartered company was able to decrease inventory while improving service levels and cutting operating costs.

"Distribution is the science of customer order and materials handling," says Bernard. "With 48,000 line items in our catalogue, maintaining service levels without excessive inventory is no mean feat—and in this business making a profit means staying lean."

At VWR, the computer handles each major operating function: processing customer orders, directing warehouse operations to pick orders and store incoming merchandise, managing inventory, and generating purchase orders. The company, a subsidiary of Univar Corp., uses 110 IBM 3277 Display Stations in a nationwide network based on the Customer Information Control System/Virtual Storage (CICS/VS) running on a System/370 Model 158.

Sales people use online inquiries to give customers immediate answers on item availability, order status or prices. Customer orders are entered directly at the terminals to provide rapid turnaround.

To store and retrieve goods in a main warehouse, computer-generated punched cards control electric vehicles which move automatically to the selected aisle and storage bin.

The capture of transaction data during terminal procedures has reduced data preparation costs as well as most sources of data error. Incoming inventory is entered into the system sooner and becomes available sooner.

According to Lester Gray, vice president of management information and computer services, the rapid implementation of the new and enhanced systems would have been more difficult, and many of its most valuable features would not have been feasible, without CICS/VS, an IBM program which manages terminal transactions and file accesses in online systems. "The flexibility and device independence of CICS lets us add sites, add new types of terminal inquiry, and introduce major system enhancements quickly and easily, without disruptions," he says.

"CICS enabled us to include some special features," Gray adds, "including online inquiry access to our backorder system which automatically releases merchandise for delivery as it is received. The system makes provisions for expediting customer orders or handling emergency orders.

"Our applications include a marketing information system which scans our files and produces reports of activity organized by customer, product, vendor or geographic area. This has helped us to identify obsolete items and to supply valuable information to our customers, vendors and operating people.

"We use the system to compile the data for our quarterly price book directly from the price files.

"An important thought behind our 1975 acquisition of Treck PhotoGraphic Inc., a $90 million nationwide distributor of photographic supplies and equipment, was that we could support 32 new locations and Treck's product line with our existing CICS system.

"With the flexibility and modularity of CICS, we were able to add Treck to our online system easily," Gray reports. "Without CICS, integrating Treck would have been very costly and absorbed our developmental resources for a long period of time."

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## IMS/VS Helps Tires Roll at Firestone

"During the last six years, Firestone has reduced overall costs for warehousing and shipping, transportation and inventory by 10% below what they would have been without the innovations opened up by our information system," says Paul Heise, director of inventory management.

Firestone Tire and Rubber Company began developing its Firestone Inventory Management System (FIMS) in 1968. Four years later it started converting to Information Management System/Virtual Storage (IMS/VS), in order to integrate all subsystems through a common data base.

Today, FIMS is an online system that responds to inquiries and transaction entries from any of 400 IBM 3277 Display Stations in Firestone's nationwide network of sales offices and warehouses. It supports customer order processing, production scheduling, inventory management, warehouse operations, and physical distribution.

Salespeople use terminals to enter customer orders or obtain complete order status information. The system continuously monitors inventory and customer orders, and provides production schedules to tire-making plants. It monitors production, keeping track of tires built to 6,000 different specifications and adding newly made tires to inventory each day. And it schedules the distribution of tires, including warehousing and the loading and routing of trucks.

"With FIMS, we've been able to respond faster to customers' needs while reducing inventory," Heise notes. "It has permitted us to regionalize our distribution system, reducing 45 warehouses to 22 high-volume distribution centers."

*The FIMS online computer system allowed Firestone to improve customer service while cutting back from 45 warehouses to 22 facilities like this modern Cranbury (N.J.) Distribution Center.*

"Under IMS/VS the data base used for order entry is the same one that deploys inventory and schedules production," notes W. L. Smith, assistant controller and director of data processing. "This has enabled us to add some valuable new functions to the system.

"For example," he continues, "the computer organizes orders so that a load for a specific truck or delivery run is all drawn out at one time. We can sort and batch orders from one customer or one geographical region to insure that only full trucks go out, with deliveries grouped by area. We can automatically handle special instructions, such as orders dated for future delivery or specified for a certain day of the week."

While most of FIMS processes current transactions, one subsystem analyzes historical data. "The IMS/VS data base enabled us to develop the Inventory and Distribution Research subsystem," Smith notes, "which analyzes historical patterns in our tire operations."

"This kind of research is vital to our inventory management people," Heise adds. "It helps them select sites for regional warehouses and plan the details of our physical distribution system."

*Advertisement*

*Nebraska corn grower Kenneth Bruns takes a reading of soil moisture, one of the variables considered by Agnet in the calculation of an optimum irrigation schedule.*

# Serving the Farmer in the Field

Nebraska farmers are conserving water and cutting the costs of feed and energy with the help of Agnet, an agricultural network developed at the University of Nebraska.

"Our controlling idea in designing the system," says Thomas L. Thompson, professor of agricultural engineering at the university, "was to eliminate the need for any special user training, yet still have a sophisticated interactive system."

Thompson is co-developer of Agnet at the Institute of Agriculture and Natural Resources on the university's Lincoln campus.

After two years, farmers are attributing significant savings in feed costs, water and energy to the system, which offers more than 100 different applications and is based on an IBM System/370 Model 158 at the Nebraska State Department of Administrative Services.

To use Agnet, the farmer or county agent enters the details of the problem at a terminal in a county agent's office, a district station or at the university.

Says James G. Kendrick, professor of agriculture economics and the other co-developer of Agnet: "The user signs on by keying in one word, the name of the desired service such as 'Beef' for a cattle performance simulator or 'Dry' for a simulator of grain-drying systems.

"The computer takes it from there, guiding him through a session. It begins by asking for parameter values: type of drying equipment, capacities, fuel costs and the like. It displays a menu for selection of qualitative parameters such as crossflow or counterflow dryer. For numerical parameters, it asks the user to key in a value. Or the user may enter a zero and the computer will insert a default value from updated agricultural statistics.

"If the user doesn't understand a request, he keys in 'Help'," Kendrick notes. "The computer then displays an explanation of the question and of the significance of each possible answer."

Farmers are using Agnet to perform such calculations as irrigation schedules based on soil moisture and crop data, minimum-cost feed mixes, crop-drying schedules, financial analyses of capital investment or crop commitments, soil analyses, pest control and fertilizing schedules and many others.

# Computer Supports Hospital Patient Care

When a nurse anywhere in Harris Hospital wants to order a test, medication, or X-rays for a patient, she steps up to one of 102 terminals in nursing stations and other operating areas of the 628-bed Fort Worth, Texas, hospital and keys in the patient's name and indicates to a computer the service she requires.

Much of the actual operation of the hospital—patient care and administrative work—is accomplished through the computer. A realtime medical information system accepts the order and forwards it to the laboratory or other service department. The computer adds currently applicable details of the procedures to orders for tests or X-rays. When the results are available, the system returns them to the requesting station.

## Users Enter Data

"The users do all of our data entry at terminals," says Herbert A. Witt, director of data processing. "By leaving control of information and responsibility for its accuracy with the user, we eliminate most sources of data error."

In the laboratory, for example, the response of the computer to requests for service is controlled by the pathologists; they enter the test parameters as data. "What our programmers have supplied is a completely generalized structure for a laboratory test procedure. The pathologists specify each step of the test, and such parameters as the normal range of each test variable."

User confidence, says Witt, is essential to successful implementation of a system like this. "You can do so much more for your users after they've learned to trust you, to be receptive and to work with you."

"You have to earn that confidence," says Michael Herrmann, assistant director of data processing. "It's a self-reinforcing process: the more user confidence we have, the more we can do for our users.

"We try to avoid urging on them ready-made solutions which they have had no part in specifying. And we stay in touch during the development process, getting their help and approval on details of the system performance. This gives them a sense of identification with the system and a readiness to help make it work."

"Our emphasis has been on performing patient care, as distinct from recording and reporting after the fact," Witt says. "The main purpose of the system is to relieve doctors and nurses of paperwork."

As with laboratory tests, Witt explains, authorized users can also enter, through a 3277 Display Station, orders for medication, X-ray procedures and other patient care services.

## Query Patient's Program

An authorized user at any terminal can determine a patient's medication program or other medical information, or query the patient census, inventory systems, patient billing or payroll system.

Administrative people perform many of their duties through the computer, including management of bed assignments and calculation of insurance benefits. There is a patient billing system, one for purchasing and inventory, and a payroll system.

Admissions personnel, pharmacists, administrators and other users interact via terminals with any of these systems, accessible online under Customer Information Control System/Virtual Storage (CICS/VS).

*When a nurse at Harris Hospital orders a test for a patient, an online information system displays the detailed test parameters for the technician here in the laboratory. Results are reported back through the same system.*

# MVS Takes Over Swiftly at Fairchild

Global data processing networks—once a dream and later a daring innovation—are now basic to the operations of a number of businesses around the world. But this kind of far-flung organization demands a closely integrated information and data processing system if it is to function effectively.

One company whose manufacturing and marketing efforts span the globe—Fairchild Camera and Instrument Corporation—is establishing just such a system. Within Fairchild, a manufacturer of electronic components and systems, plants and sales offices in the U.S. and overseas are linked directly to an IBM System/370 Model 168 computer at its corporate headquarters in Mountain View, California. The company transmits complex order entry transactions and manufacturing data over a network with which it is linking nearly 100 of its locations around the world.

Early in 1976, Fairchild converted from OS/VS1 to OS/VS2 Multiple Virtual Storages (MVS). Since MVS increases the number of terminal users the system can serve, and because it maintains a predictable terminal response time during peak loads, it provides strong support for combined online and batch operations.

"Our data processing systems really drive this company," says Burleigh Cook, director of information services for Fairchild. "With worldwide operations in the balance, we wanted assurance that we could keep going when the going got tough. We achieved that reliability with the MVS operating system.

## Sophisticated Error Recovery

"We are particularly impressed with the sophisticated error recovery facilities and procedures incorporated in the MVS software," continues Cook. "It has quicker capability for diagnosing problems and correcting them automatically than any operating system I know of.

"This in turn has meant higher availability, which is crucial to the development of an online system such as ours."

Fairchild and IBM completed joint planning for the move to MVS in November 1975, less than a month after the decision to convert was made. By January, two months later, the system was fully operational.

"It seemed as though we put six months' effort into those two months," says Ray Yasukochi, Fairchild manager of technical support, who was in charge of the move. "Actually, we had a highly detailed plan which we carried out 'by the numbers,' working shoulder to shoulder with IBM. It was a smooth transition with a minimum of disruption."

*A quality control worker inspects the components of a digital watch, one of the high-technology products of Fairchild Camera and Instrument.*

*DP Dialogue is designed to provide you with useful information about data processing applications, concepts and techniques. For more information about IBM products or services, contact your local IBM branch office, or write Editor, DP Dialogue, IBM Data Processing Division, White Plains, N.Y. 10604.*

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# DBMS Language Ups State Agency Efficiency '1,000%'

LANSING, Mich. — The Michigan State Housing Development Authority (MSHDA) here exists to provide mortgage loans for low- and moderate-income housing, using the proceeds from the sale of tax-exempt bonds. The authority also is a major conduit for federal housing subsidy funds coming into Michigan.

In addition to its pipeline of development proposals, the authority has committed about one-third billion dollars to over 100 developments throughout the state, of which nearly 90 are completed and occupied.

Subject to business discipline, the authority is required to pay back the bondholders, and hence its directors and management have a serious interest in the continuing economic vitality of the projects they finance.

Faced with a continuing need for prompt and accurate reporting, the authority's research and information systems unit found itself using a processing language which was adequate for report generation, but which, according to information services chief Thomas Whalen, "just couldn't cope with the volume of updates at anywhere near satisfactory cost levels. We had a lot of grief, and we finally gave up and made do without information we should have had."

MSHDA solved its problem by switching to Information Processing Language (IPL). It was first implemented on an experimental basis and since January 1976 has been in general use for the management of large data base applications.

MSHDA has achieved about a 20% improvement in report generation and "at least a 1,000% improvement in efficiency — just being able to understand what's going on — and in the cost levels associated with updating the data base," Whalen said.

In authority-financed projects, the residential mix in a development can be crucial, he explained.

"We are constantly looking at social welfare considerations simultaneously with the need to pay back the bonds. Certain information, such as a high vacancy rate or rapid turnover of apartments, can trigger closer financial monitoring," he added.

"At the same time, racial and economic imbalances signal the need for greater effort in affirmative marketing to the eligible group which is underrepresented. Also, comparable existing developments are examined in evaluating new development proposals, especially in multiphase projects," Whalen said.

### Occupancy Profile

To track that kind of information and provide a complete occupancy profile, MSHDA carries records covering applicants for housing subsidies and the status of each application, the rent the occupants pay, their sex, race, type of work, salary, other income such as pensions or public assistance, number of children and their age ranges, type of housing program under which they are registered and special information on the elderly and the handicapped.

This very large data base, called the Resident Profile, contains 12,800 records, each with 32 fields of information. It grows an average of about 1,000 records a month and in peak months by 2,000 records, Whalen noted.

The complete file, including identifying information, is kept on tape. For privacy, statistical analysis and report generation, an abstracted record set without identifying information is retained on disk, he added.

A rent roster is generated monthly, listing residents in each unit in each development, the status of their applications and the amount of each resident's monthly payment.

Special reports are generated irregularly but frequently, responding to specific questions in forecasting, planning and evaluation of the authority's program.

In addition to the new records added each month, the file is updated from move-in and move-out lists furnished by the project managers. All new information is coded on tape in Lansing, and the tape is sent to the Ann Arbor, Mich., headquarters of ADP Network Services, Inc., the remote computing services company that supports IPL.

"When ADP gets our tape," Whalen said, "the supervisor of the resident eligibility unit gets on a terminal. MSHDA has a Fortran program which asks questions and the supervisor responds. The Fortran program writes out IPL commands for different steps in the update procedure. Basically, the supervisor is checking for errors on the tape which have been spotted through a validating program which we initiate. The file is cleared and that's all there is to it."

### Questions Anticipated

IPL's simplicity in use has permitted Whalen to write what he calls "an arsenal of preprogrammed reports for the kind of questions which come fairly frequently. Because IPL has the capability of putting a filter in front of a preprogrammed report, I can pick out a particular housing development, for instance, and get a one-page printout on its occupants within five minutes.

"That requirement has come up, and when I put the report in front of the man who asked the question within just a few minutes, it was impressive," Whalen said.

"That's a major advantage of IPL. A lot of information can be obtained without having to sit down and write a program to get it out," he added.

Another major advantage of IPL over the language formerly employed occurs when a user does have to sit down and write a report program. "A lot are cross-tabs and some involve complicated selection criteria, breaking information apart in complex ways. This is probably the biggest edge that IPL has: It is much easier to do structured programming," Whalen said.

MSHDA programmer Ken Lord, who works with IPL daily, found the simpler language "saves a lot of time, both in programming and debugging."

Lord and supervisor Barbara Bray agree IPL is a "cost-saving language in computer and staff time." Bray said one recent report, on the average of rentals across the entire data base, ran in about half the time previously required.

Whalen and Lord have had some problems, however, and Whalen cited as an example a "discrepancy" which occurs when transferring a Fortran random I/O file to IPL. "We run it through an editing system to change the blocking factor and it works," Whalen said. Fortran closed the file at the end of a block. IPL — and the editor — closes at the end of the last record.

"That kind of procedure is a way of life at most computer installations and here we consider it a bug. I guess that gives some indication of how spoiled we have become."

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## File Loading a Spare-Time Task

# Clerical Problem Mars Supplier's Movement Into DP

By Don Leavitt
Of the CW Staff

ALBUQUERQUE, N.M. – A company can move smartly into data processing with a good idea of how systems should be developed and what benefits may accrue from their use, and yet lose, or at least delay, the biggest potential benefit of all because of clerical problems.

That appears to be the situation at a local jewelry supply house where a Data General Eclipse C/300 with well-conceived applications has been installed and a top executive has taught himself a great deal of DP in the last two and a half years.

Some of the programs, such as payroll, are running. But silver inventory control and order entry, the system that could justify the installation of the computer and which was ready some time ago, has yet to go fully into production because the basic file data hasn't been loaded.

Alan Bell, vice-president of Rio Grande Jewelers Supply and the man behind its DP operations, seemed discouraged as he talked about the problem. Without any full-time data entry clerks, "loading the file is a spare-time operation of our regular clerks and it has a low priority. So we wait."

Discussing the system last month, he said the tight controls provided by the system should allow the company to have one more turnover each year in its precious metal inventory. That extra turnover would pay for the DP installation in the first year, he estimated.

### Babe in the Woods

It's been a long pull for Bell. Two and a half years ago his knowledge of DP was "nonexistent" by his own admission, but he knew that somehow a system should be able to help his company. That would be fine, as long as it didn't disrupt the company's way of doing business, he thought.

He started his search by answering an ad in a jewelry trade paper. It spoke of a computer for less than $20,000 that "would do everything," Bell said, "but the literature I got back, I couldn't read. It was filled with bits and bytes . . . "

A meeting with people at a local time-sharing house was equally frustrating, but a three-day seminar at a university finally gave him an insight into "minicomputers for businessmen." The technical sessions were good, he said, but even more important, vendors were there showing what was available and talking about their products.

Bell did some rudimentary evaluation and eliminated several hardware vendors. At that point, however, he and his colleagues reached a new awareness: they should sit down and talk to some knowledgeable people about software. "Up till then, we'd been looking for a tool before we had defined the job we wanted the tool to do."

Bell began talking to people from the Englewood, Colo.-based Automated Quill, Inc. (AQI) and some from a more local scientifically oriented software house. Burroughs and Honeywell also brought in their software people but they were eliminated quite quickly, Bell noted.

### Right at Home

AQI won his confidence "because it seemed very comfortable in the multiterminal, multiprocessing environment and equally comfortable in discussing business applications." It was on AQI's recommendation that Bell's company ordered the Eclipse from Data General.

AQI was commissioned to build the software to go with the mini, as Bell and Rio Grande realized they couldn't afford to keep the type of programmer they needed for the short-term development of the system.

All the systems have data base-like facilities based on a much modified version of AQI's Mini-Miz file handler. The feature application is the CRT-based order entry and inventory control system, now stalled with the partially loaded files.

Payroll is another application, Bell noted, and so is a basic form of accounts payable. Accounts receivable is in place though it isn't working off invoices yet, since they too are part of the order entry system.

For now, the "receivables" system is treating the totals of manually prepared invoices as journal entries which are used to create statements, Bell explained.

A data retrieval system for Rio Grande's mail department appears to have order entry capabilities and with a twist on the more conventional system that may provide the company even better inventory control – once the file is in place.

Requests for materials are entered and picking slips are generated. Once the warehouse workers have acted on the slip, it goes back to the mail department showing what was picked. The quantities may vary slightly from what was ordered and it is these variations in the precious metals that make the difference, Bell said.

In precious metals, he explained, it's not unusual to have inventory turn over 12 times a year. At that rate, and with the fluctuations in costs, the difference between what you have in stock today and what you have tomorrow can be extremely important.

## Masters Degree Possible From San Diego Classes

SAN DIEGO, Calif. – Los Angeles-based West Coast University is extending its graduate program in computer science, making it available to part-time evening students in this area starting in April.

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# Statistical Package Confusion Has Multiple Causes

**By Robert Moreau**
Special to Computerworld

Many articles in *Computerworld* have shown clearly there is growing maturity in the marketing and acquisition of packages. But there are pockets within the computing community where the "growth" is slow at best.

Both vendors of statistical packages and their users, for example, have a long way to go to reach maturity. Various problems result from lack of technical knowledge on the part of the user and lack of professionalism on the part of the vendor.

The key to my concern is that the responsibility for statistical results rests on the statistician, not the statistical package or any other tool he uses. It is his reputation at risk if his results are not as significant as he reports them to be.

But there are all kinds of users and that is certainly part of the overall problem:

- A novice researcher or a businessman has learned he can use a package to analyze results of a survey. But he has no idea what statistics are most appropriate for his data or which package he should use. Once he has made a choice, he probably faces months of work rewriting hundreds of responses into a format that can then be keypunched before he runs his analysis.
- A Ph. D. has some work to do. He decides to run the stepwise regression offered by Osiris because its Beta coefficients would add depth to the residual plot he received from the BMDP regression. His surveys are read from special forms by a scanning device and fed directly into the computer.

Despite different backgrounds, however, most users share a common handicap: They usually don't have a computer background. Many depend on consultants or assistants to keypunch data, write JCL or just digest the volumes of descriptive material that exist about statistical packages.

Should a user's statistical methods be determined by chance or by need? Selection by chance almost seems inevitable.

Given the number of statistical packages available and the variations in results they produce — "F. ratios," "intercepts," "means," "plots," "residuals" and "T tests," among others — a user must have a great technical knowledge to find the methods he needs.

### No Standards

Statistical packages today have no standards, standardization or compatibility with one another. Every vendor, for example, has a different concept of what statistics should be included in a regression. There are no standard practices for handling the many types of statistical analyses.

The user must learn a unique control syntax for each package. And once he has processed his raw data and produced a system file usable with one statistical package, he cannot use the same file with any other packages.

But even if a user becomes very knowledgeable about statistical methods, he may still be in for problems.

A product that carries a vendor's name should carry his pride as well, even if the product is distributed at cost, as many statistical packages are. A package and everything associated with it should be well-tested before it is distributed.

The following illustrates just a few of the problems I encountered in installing Biomedical Computer Programs (BMDP) from the tape supplied by UCLA:

- Duplication of the delimiter card at the end of each module causes half the modules created from the tape to be empty and the other half misnamed.
- Since UCLA provided no explanation of SIGN, it must be removed or changed to a comment, otherwise subroutine TRANS cannot be executed.
- To test run BMDPID and BMDP2D one must supply one's own test data and control cards. The test file from UCLA, however, was not copied correctly.

Over the years, thousands of systems programmers have had to resolve these and other problems for themselves, just to install BMDP. One programmer at UCLA could have resolved them originally.

While both the user and the vendor have room for improvement, the major responsibility is with the vendor. If a vendor supplies a package that is easier to use, the user won't need as much technical knowledge to run it.

The control statements should be made easier to use each time a package is revised. A standardized syntax should also be agreed upon. Standardization could be achieved easily by developing a "front-end" program that would generate control statements for the user from simplified, standardized formats.

Statistical Analysis System (SAS) builds a work file that is compatible with BMDP. If all the vendors would agree on a format and follow the lead of SAS, users would not have to redefine their formats, labels, missing values and other control statements to use combinations of packages.

Vendors of statistical packages cannot direct their products toward a mature market. The only users that should be thought of as professionals in using statistical packages are the statistical consultants. The actual user may be a sociologist, student or professional in fields other than computing. Users should not be required to take a special course to use a statistical package.

For their part, users can help relieve the gap between themselves and the vendors by subscribing to available newsletters and sharing what they know in user groups. The vendors of BMDP, Statistical Package for Social Sciences (SPSS) and other packages provide periodic newsletters that are receptive to user comments.

Periodicals can help by publishing more articles dealing with this problem.

*Moreau is a consultant with Automated Concepts, Inc., New York, N.Y.*

# Symbolic Debugger Included in Vulcan

FT. LAUDERDALE, Fla. — Enhancements to the Vulcan operating system for Harris Corp. S100 and S200 systems include Vbug, a symbolic debugging facility for use with Fortran or assembly programs, according to a spokesman.

Other features include a data pool definition language, Fortran support for integer character types, a CPU usage and disk storage limitation facility and improvements in the sort/merge utility, Harris said.

The data pool definition processor centralizes the definition of global or shared data items, eliminating a common source of error, the spokesman added from 1200 Gateway Drive, Ft. Lauderdale, Fla. 33309.

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### Via User-Premise Earth Stations

# SBS Net to Connect Various Sites of Large Companies

*With recent approval from the Federal Communications Commission (FCC) in hand, Satellite Business Systems (SBS) hopes its digital satellite network will be operational by 1981 in the 12- to 14 gHz bandwidths.*

*The following article further explains the operational ways and means of the joint venture by IBM, Comsat General Corp. and Aetna Casualty and Surety Co. [CW, Feb. 28], in terms of user-premise earth stations, transmission speeds, protocols and interfaces.*

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — The Satellite Business Systems (SBS) digital network is meant to connect various establishments of large corporations and will be switched within the customer-premise earth stations of each user, according to Ted Schurmans, SBS' manager of systems and applications requirements.

The decision to build an earth station at a particular location will depend on how far the spot is from other earth stations, the volume of information that location will send and receive and the type of service involved, Schurmans said.

SBS will conduct an involved analysis with each of its users to determine the best number of earth stations, he told members of the Computer & Communications Industry Association's Fourth Annual Caucus here recently.

The SBS system will provide information switching at a variety of speeds — anywhere from 2.4 kbit/sec to 6.3 mbit/sec — and will produce an internal accounting of the traffic of each of its users.

These corporations can then bill their various departments or organizational entities on a usage basis, he noted.

The system will also make it possible for each user to have "the same telephone number" by using a common numbering plan for each one, he said.

Users will contend with each other for use of the satellite's capacity. The earth stations belonging to one corporation will even vie with each other for satellite time, Schurmans noted, adding the goal is to use the satellite's capacity as efficiently as possible.

Designed to last for seven years and to carry 10 45-mHz transponders which receive and send digital signals, the satellite will accommodate several user networks on each transponder, Schurmans said.

Users won't know they're sharing the transponder with other companies, however, he added.

Each transponder will allocate capacity to a "pool" which will be available to its users "on demand." If a user needs to exceed his fixed capacity in the transponder, he is given a piece of the pool for a period of time, he said.

Satellites would be launched as needed, Schurmans said, adding they are normally placed in orbit between two and five degrees apart along the equatorial arch.

A master clock would keep the whole system in sync, Schurmans said.

Users would connect to the system via an analog interface for voice-only and voice/data analog traffic — analogous to normal telephone or PBX transmissions — or via a digital interface for higher speed data such as that generated by business machines, he explained.

The digital band would accommodate present communications interfaces like the RS-232, the RS-366 and the V.35 for fixed and switched connections.

SBS would also expect to be able to handle the circuit interface designated X.21 and the package or message-switched interface called X.25, Schurmans said.

SBS plans to publish any buffer information which would promote better interconnection but, for security reasons, it does not expect to make public any interface information connected to the earth stations, he added.

**Development of New Products**

By discussing its plans now, SBS hopes to stimulate the development of new products — particularly high-speed transmission devices in the terminal and facsimile areas. Schurmans noted that SBS defines a "terminal" as "anything that will connect to our system."

SBS would maintain monitoring and maintenance earth stations of its own, Schurmans indicated. Computers would definitely be involved in this control-management function.

IBM and the communications traffic between its member parts will serve as the guinea pig for a test of a "preoperational" SBS system beginning this year.

### Must Know Banking Industry

# Bank Nets' Success Tied to Managers

ATLANTA — Effective operation of a bank's data communications network today is totally dependent on telecommunications managers' familiarity with the banking business, according to the executive vice-president of Chase Manhattan Bank.

Too often in the past, this has not been the case, Barry F. Sullivan, who is also a member of Chase's Management Committee, said at a recent American Bankers Association telecommunication workshop here.

"Telecommunications people traditionally have looked upon their skills, their expertise — even the systems they use — as relatively generic commodities, almost automatically transferable across company and industry lines," Sullivan said.

"While I would agree that your functional skill is telecommunications, your specialized skill is banking. And banking, as much as telecommunications, should be your major concern," he told workshop attendees.

The same is true for bank managers today, he added, noting the ABA's recent National Bank Telecommunications Survey showed 1% of a bank's funds for operating expenses today goes toward telecommunications.

About $500 million is spent on telecommunications alone by the banking industry, he said, quoting the survey.

**New Look at Function**

Sullivan proposed "a framework for a new way of looking at the telecommunications function within a bank."

The foundation for this, he indicated, would be for bank telecommunications managers to learn what drives the banking business: what markets are important and what bank managements' priorities are.

"Fighting the tendency to think exclusively in terms of volumes of transactions, peak load times and number of messages . . . Serving our profitable customers is our primary priority," he said.

The answers to the right questions asked by those specializing in communications "generally revolve around a fundamental need for flexibility in delivery systems," Sullivan explained.

By learning the banking business, communications managers can reduce the traditional emphasis on cost optimization and demand averaging on a large network and instead concentrate on offering a quality product with the traditional goals in mind, he said.

In addition, telecommunications managers must meet the challenge of the rapid and extensive transition period in which banks are involved, he said.

The convergence of rapid change, increased costs and retail competition "has contributed to the breakneck pace of retail bankers to find the most cost-effective distribution network.

"At this point, that optimal mix

*(Continued on Page 38)*

## Link Control Standard Advances

WASHINGTON, D.C. — The American National Standards Institute (Ansi) X3 committee has accepted for public review a proposed standard for advanced communications link control procedures.

The proposed Advanced Data Communications Control Procedure (ADCCP) standard was developed by the committee's X3S3 subcommittee.

The ADCCP, or X3.66, is a bit-oriented system control technique standard which defines the communications protocols for all link control systems.

It is part of the overall international High-Level Data Link Control (HDLC) elements of procedure, according to an Ansi spokesman.

The proposed standard has been forwarded to Ansi so a notice in the institute's biweekly publication can be published stating that the documentation is available for public review, he said.

The four-month public comment period for the ADCCP proposal will begin later this month, he added.

Copies of the proposal are available for $4 from the Computer and Business Equipment Manufacturers Association, Attention: Standards, 1828 L St. N.W., Washington, D.C. 20036.

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# Epicom Adds Unit for Recording Data Flow of Nets in Real-Time

ALTAMONTE SPRINGS, Fla. — Epicom, Inc. has introduced Datatape, an independent real-time recording system for communications networks.

The unit accepts Ascii, Ebcdic, IBM Synchronous Data Link Control or any other bisynchronous, unisynchronous or isochronous line discipline, an Epicom spokesman claimed.

Data can be recorded in real time at switch-selectable transmission rates from 50 bit/sec to 19.2 kbit/sec, he said.

In its usual operating mode, Datatape records full-duplex data and up to six control or status signals at rates to 9,600 bit/sec. These standard RS-232 interface signals can be eliminated when recording at higher data rates, Epicom said.

Full tape cartridge capacity is 23M bits of unformatted data; because recording time is speed-dependent, total data dialogue capture varies from 34 hours at 50 bit/sec to about 10.5 minutes at 9,600 bit/sec for data and status, the company noted.

The unit also has switch-selectable playback rate. Data is recorded at the system's operating rate, but can be slowed down or accelerated for detailed analysis and troubleshooting operations.

The RS-232-compatible device is installed in the line between either a CPU or a remote terminal and its associated modem. Other interface adapters and a variety of accessories are available, according to the firm.

Datatape cost $5,250, Epicom noted from 592 N. Douglas Ave., Altamonte Springs, Fla. 32701.

# Paradyne Has SRM, Offers LSI-96 Lease

LARGO, Fla. — Paradyne Corp. has introduced a limited-range modem capable of 19.2 kbit/sec transmission on two- or four-wire facilities.

The firm also announced it is offering two- and three-year lease options on its LSI-96 modem.

The Short Range Modem (SRM) is strap-selectable for transmission speeds of 9,600-, 7,200-, 4,800-, 2,400- and 1,800 bit/sec in addition to the 19.2 kbit/sec rate, Paradyne said.

It provides controlled-carrier or continuous-carrier operation on wire facilities and is said to have a full range of both local and remote diagnostic modes.

The SRM costs $900 or $30/mo on a two-year rental plan and $25/mo on a three-year rental plan.

In addition, the company's LSI-96 modem, which costs $4,500 to buy, can now be rented for two years at $160/mo or for three years at $135/mo.

The LSI-96 will operate on AT&T unconditioned lines, the spokesman noted from 8550 Ulmerton Road, Largo, Fla. 33540.

## Data Briefs

### RCA Globcom, Telenet Plan Transatlantic Network

NEW YORK — RCA Global Communications, Inc. (RCA Globcom) and Telenet Communications Corp. will provide a packet-switched data communications service between the U.S. and other overseas points if the companies gain Federal Communications Commission (FCC) approval.

The jointly sponsored service is designed as an economic means of communications between computers and a wide variety of terminals operating at low and medium speeds, an RCA Globcom spokesman said. It will be available on a demand basis with rates based on the volume of data exchanged, he added.

RCA expects primary users to be multinational corporations that operate data base and time-sharing systems, as well as public data banks and commercial computing service bureaus.

RCA Globcom will furnish the overseas data transmission facilities and gateway switching equipment linking the Telenet network and its users in the U.S. with packet-switching facilities abroad, the company said.

Initial service is expected to be furnished to the UK and several Western European countries pending FCC approval.

### Rolms Get A/D Converter

SANTA CLARA, Calif. — Rolm Corp. has introduced an analog-to-digital converter interface module for Rolm computers.

The Model 3756 A/D accepts bipolar or unipolar differential analog input signals and performs a 12-bit conversion in 24 microsec, the company claimed.

Optional features of the Model 3656 include sample-and-hold logic and on-board multiplexing of up to 16 differential input channels with facilities for off-board multiplexing of up to 256 inputs, according to the firm.

The features of Rolm's Model 3655 A/D converter have been retained, according to a spokesman. The 3656 can be configured as a plug-compatible 3655 replacement, he added.

The single-channel Model 3656 costs $1,600. Additional input channels, in sets of 16, cost $750 per set.

The sample-and-hold capability is an additional $400, Rolm said from 4900 Old Ironsides Drive, Santa Clara, Calif. 95050.

### SDLC, SNA, SBS Analyzed

CAMBRIDGE, Mass. — The Yankee Group has published a technical report detailing and explaining the design and development strategies of IBM's Synchronous Data Link Control (SDLC), Systems Network Architecture (SNA) and its Satellite Business Systems (SBS) joint venture.

The 213-page study, "IBM — The Grand Design: SBS, SNA, SDLC," discusses IBM's communications control procedures and their implementation and costs; frame structures and packet switching; and vendors' future options in terms of the developments, the research firm said.

The report costs $695, which includes four quarterly updates, the firm said from P.O. Box 43, Cambridge, Mass. 02138.

### Beall Raises Switch Price

CLIFFSIDE PARK, N.J. — John Beall & Co., Inc. has raised the purchase and rental prices on its plug-compatible replacement for the IBM 2914 switch, which allows eight strings of control units to be switched among four CPU channels.

Model 2 channel switches ordered after March 1 will cost $29,000 to buy or $800/mo to rent. The previous prices were $22,450 and $660/mo respectively.

The monthly rental prices include one-shift maintenance. Maintenance prices for purchased units remain unchanged at $68/mo, according to the firm.

A comparable IBM 2914 sells for $51,105 and rents for $1,092/mo, according to Beall at 447 Gorge Road, Cliffside Park, N.J. 07010.

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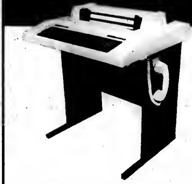

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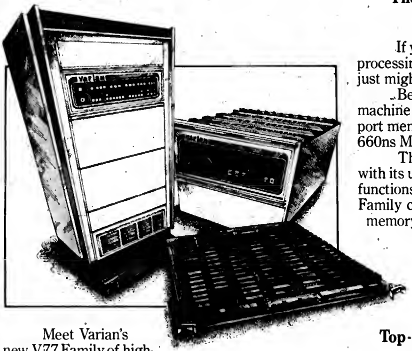

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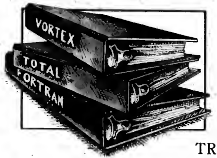

Usually found on only larger computers, TOTAL allows you to define and access your data base with powerful, high-level language processors like COBOL, FORTRAN IV Level G, and RPG-II. Opening the door to large libraries of already developed applications programs.

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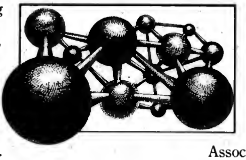

For those wanting less wasted overhead, there's a less expensive, high-performance alternative.

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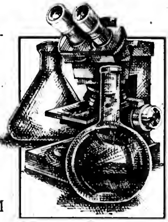

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For additional V77 Family planning literature, contact any of the 38 Varian offices listed below, or Varian Data Machines, 2722 Michelson Drive, P.O. Box C-19504, Irvine, California 92713, (714) 833-2400. In Europe, contact Varian Associates Ltd., Molesey Road, Walton-on-Thames, Surrey, England, Telephone 28971.

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## IDS Adds Channel Tester

PROVIDENCE, R.I. — International Data Sciences, Inc. (IDS) has added a device for high-speed synchronous testing of data channels to its line of transmission test set products.

Features of the Model 3000D test set include built-in RS-232, RS-422, CCITT V.35, current-loop, MIL 188 and TTL interfaces as well as individual displays for errored seconds, total seconds, errored bits and total bits, with autoranging on all counters, the company said.

Other features include a 65,535-bit pseudorandom test pattern plus six others; operation in simplex, half- or full-duplex modes up to 10 MHz; and 10 LEDs to monitor key interface signals.

The Model 3000D has internal 50- and 56 kbit/sec clocks for external timing and was designed to operate with IDS' 2900D printer to provide a record of test results, the spokesman noted.

The test set is priced at $6,300 from the firm at 100 Nashua St., Providence, R.I. 02904.

## Bank Nets' Success Tied to Managers

*(Continued from Page 33)*

of endpoits in this network is unclear and tests continue with point-of-sale terminals, automated teller machines, employer cash dispensers and, of course, branches," Sullivan said.

"The retail hanking business today is also characterized by rapid regulatory and technological change. Ohviously," he contended, "a husiness in such transition cannot afford to be burdened by an inflexible telecommunications network."

Sullivan was aware tariffs for telecommunications services ure based on economies of scale, but added this should not deter efforts to refine systems and build in flexibility.

The cost-effective/cost-optimization mode, he suggested, determines "level of service" decisions by telecommunications managers.

But "I would propose to change that," Sullivan said, urging telecommunications managers to "base them more on qualitative considerations. Increase the emphasis on speed of response and reliability and quality of service offered and on security to help your bank distinguish itself from competitors."

This will help u bunk meet the challenge of increased specialization if its telecommunications managers become what he called "market-sensitive."

"I don't buy the notion thut telecommunications, by its nature, is the 'great leveler'; that is, that cost-effectiveness is the primary determinate of a telecommunications system.

"On the contrary, I think bunk telecommunications managers can play a major role in ussisting the marketers of services und in differentiating products," he said.

The financial services industry and especially banks should prove to be a major growth area for the utilization of telecommunications professionals, he said.

The opportunity for bank communicaitons managers, Sullivan said, is obvious, if they learn the banking business, are sensitive to its changing nature and flexible in the approach to banking's specialized needs.

## Concentrator Works With Touch-Tones

TROY, Mich. — A microprocessor-based concentrator for data input from Bell Touch-Tone telephones has been introduced by the Vocal Interface Division of Federal Screw Works.

The Votrax MC-1 concentrator is a peripheral system providing tone data input capabilities from four to 32 communications lines to any computer, the company claimed.

The system's micro controller simulates the operation of an RS-232C asynchronous terminal on the host CPU's communications adapter and controls all functions of the data sets.

The MC-1 supports data sets including the Bell 407A and 407B and Bell 403-type units as well as the Bell Transaction I Telephone, Automatic Call Distributor and Call Director, a spokesman added.

A four-line Votrax MC-1 concentrator costs $3,950; the price for a 32-line system is $15,150, he said from the company at 500 Stephenson Highway, Troy, Mich. 48084.

### IMI Reader Aimed at CRTs

MOUNTLAKE TERRACE, Wash. — A microprocessor-based bar code reader designed for plug compatibility with many CRTs and other asynchronous terminals is available from Interface Mechanisms, Inc. (IMI).

The Model 9210 offers a dual-connector interface to allow tandem operation with any on-line RS-232C terminal.

It costs $875 from IMI at 5503 232nd St. S.W., Mountlake Terrace, Wash. 98403.

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Bradner's carries 6,000 to 8,000 accounts most months, but may have as many as 14,000 during the Christmas season, Gene L. Senfield, president, said.

Five clerks were added in an attempt to deal with the increased buck-office workload. Nevertheless, bottlenecks occurred and statements closed on the last day of the month usually weren't mailed for 10 to 15 days.

"This slowed our cash flow and also limited our grasp of corrent finaneial information," Agnes Senfield, treusurer, explained. "We decided to phase into DP with the help of some local service companies."

The payroll was handled by an independent company, and accoonts receivable and a departmental sales aodit for the mall store in Salamanca were done by the NCR Data Center in Syracuse. These were just the first steps in automating records and accounting, Senfield noted.

"We didn't know for sure whether a computer was affordable for a company of our size," she admitted. "At one time we felt it wasn't. But as wages kept rising and the numher of office clerks kept multiplying, something had to be done."

There were up to 18 office clerks at Christmas, and some were transients. That required constant training hy the already overworked staff, which resulted in a decrease in efficiency. Hiring more people wasn't the answer, she decided.

### Close Ties

"We evaluated a numher of DP systems," according to Craig Senfield, vice-president and manager of the Salamanca store. "We decided to tie POS equipment as closely as possible to our own compoter.

"We felt this was important because otherwise we could have difficult interface programs between the sales terminals and the processing system or between the terminals and an outside compoter service."

After considering the alternatives, the company installed a fully integrated system that collects data at the point of sale in a form that can he entered directly into a CPU.

Data collection is done with NCR 280 POS terminals. As each sale is rung up, the sales clerk enters the type of transaction, department numher and a unique identification hefore the transaction can be completed.

Four of the terminals were installed at the Salamanca store and five in the Olean store. "We will add more terminals later," Craig Senfield stated, "but we thought we should walk hefore we run and learn what to do with the data."

In slower departments, sales are still rung up on mechanical registers. Doring the day this data is captured through one of the POS terminals as the need arises.

The system was designed to operate on-line. However, getting started, Bradner's management decided to operate the processor only part of the day, so data collectors which capture information on magnetic tape cassettes were installed in each store. Every evening the cassettes are delivered to the Salamanca store, where the computer is installed.

The NCR Century 50 system has 32K of main memory and two NCR disk drives. "We can easily upgrade to a larger system," Craig Senfield said, "and we have a 180-line printer that can be speeded up by another 100 lines per minute. We can also go on-line to the terminals. The system is very maneuverable and expandable, and that is what we wanted."

The processing system can handle three or four times the workload before opgrading is needed, he estimuted.

The first two applications were sales aodit and accounts receivable. "Some consoltants advised us to move first into merchandising application," Gene Senfield said, "but we are more oriented to accoonting. We translate our merchandising activity from the accounting figures, so we wanted to know our profit-and-loss sitoation first.

"Also, on balance, our accounts receivable income has become a sizable part of our net profit, so we wanted that on the computer as soon as possible."

The sales audit is basic to a number of store operations and has helped iron out several problems. The stores still fonction by departments instead of having cashiers; the person who makes the sale rings it up.

The total sales for the department, number of transactions, number of returns and value of the returns are reported daily. There is also a salesperson's productivity report. This details the number and value of sales produced by an individual. Senfield uses this to improve efficiency on the sales force hy reviewing it with his department managers each week.

Several people are no longer on the floor, he acknowledged, bot more importantly, by discussing the report with them while it is current, Senfield said he has helped u numher of others improve their productivity.

"The terminals also have helped tremendously with oor cash problems," he noted.

"Tax tables, which were always a prohlem when the clerks had to figure by hand, are programmed into the terminals and are computed automatically on the sale.

"Overrings and underrings also have been substantially reduced because the terminal automatically compotes change due. We used to pick op some of these problems on our audit of the sales slips, but some slipped through."

The initial operation of the system wasn't all smooth, Senfield admitted. The accounts receivable began smoothly, but it soon ran into trouble. Part of the problem was improper classification of account types.

It also took a while for manugement and the programmers to learn to speak the same language, he said.

"However, I didn't expect anything as complicated as this to go in perfectly," he added. "We are merchandising people, and we had little knowledge of computer operations."

What the company once looked upon as an affordable convenience has now become almost an operational necessity.

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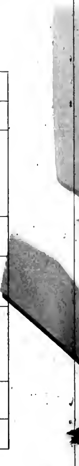
|---|---|---|---|---|---|---|
| USER REQUIREMENT | FEATURES | OWL-1200 | MOD. 1 EDITING | ADM-1A | ADM-2 | 980 |
| High Operator Data Entry Accuracy | Protected fields | Yes | Yes | Yes | Yes | Yes |
| | Low-intensity fields | Yes | Yes | Partial | Partial | Partial |
| | Numeric only fields | Yes | Yes | No | No | No |
| | Inverse video fields | Yes | Yes | No | No | No |
| | Blink fields | Yes | Yes | No | Yes | Yes |
| | Line drawing capability | Yes | No | No | No | Yes |
| Simple, Fast Editing of Data | Insert/delete character | Yes | Yes | Partial[1] | Yes | Yes |
| | Insert/delete line | Yes | Yes | Partial[1] | Yes | Yes |
| Minimized Loading on Host Computer | Host programmable send keys: send all data, send only unprotected data, send only data modified by operator, send only a "request to send" header. | Yes | No | No | No | No |
| Simplified Programming | Ability of host CPU to read device status | Yes | No | No | No | No |
| | Ability of host CPU to read device mode key settings and communication option straps | Yes | No | No | No | No |
| | Program override on mode key settings | Yes | No | No | Yes | No |
| Simplified Program Debugging | Transparent mode permits all characters to be displayed | Yes | No | No | No | No |
| Cost Effectiveness | OEM price in quantities of 25* | $1496 | $1670 | ~~$1795~~<br>* $1595 | ~~$2395~~<br>* $2095 | $1995 |

*When unit includes editing capabilities, 24 x 80 display, numeric pad, and upper/lower case characters.

[1] No Key. Requires Two Key Code

* Just announced price changes



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## CRT Designed For Data Entry

SAN ANTONIO, Texas — Datapoint Corp. has introduced an interactive data entry CRT terminal which is said to have full-duplex asynchronous communications to 9,600 bit/sec.

The 3610 features a specially coded 11-key numeric pad which permits interaction under Datapoint's Multiform software control with a host CPU.

In addition, the terminal includes an 80-char. by 24-line CRT, a standard upper- and lower-case typewriter-style keyboard and five control keys.

It has an RS-232B-compatible interface and can interface hardwired or dial-up lines.

The 3610 costs $1,950 or $80/mo on a two-year lease, including maintenance, the firm said from 9725 Datapoint Drive, San Antonio, Texas 78284.

# Gould Links 5000 Series, Tektronix CRT

CLEVELAND — Gould, Inc. has an interface which connects its 5000 series printer/plotters with Tektronix, Inc. 4000 series graphic displays.

The company also introduced an intelligent interface module designed to permit communications between its 6100 data acquisition system and remote or mobile loggers.

One Gould 5000 series electrostatic printer/plotter can produce hard copy from up to four Tektronix graphic CRTs with the Gould 889143 hard-copy interface, according to a Gould spokesman.

The hard copies are made in screen copy times from 2.4 to 30.9 sec depending on the Gould printer/plotter, the Tektronix terminal, the operating mode selected on the interface and copy size and resolution requirements, he said.

A 90° hard-copy image-rotation feature provides hard copy that is 72% larger in area than other similar printer/plotters, the company claimed.

The 889143 costs $1,800 for a four-terminal version.

### Interface Module

Gould's microprocessor-based 6100 communications interface module reportedly permits data retrieval by telephone or telemetry from remote Gould Model 6100 data acquisition systems.

The interface module has RS-232C and current-loop connection capabilities and is compatible with Bell 103A and 202C or 202D data sets, according to the spokesman.

Data can be transmitted in formatted Ascii, hexadecimal or transparent binary code, which can be selected automatically or by the operator through thumbwheel switches, he said.

The module comes in two versions, with or without a local display. With a local display, an operator can dial up the remote loggers and inspect the input voltages on each channel, the spokesman said.

The interface with local display costs $3,475; the cost of an interface without the local display is $2,974. Both prices include the required interface card for the 6100 data logger, he said from Gould's Instrument Systems Division, 3631 Perkins Ave., Cleveland, Ohio 44114.

# CDC 752 Teletype-Compatible

MINNEAPOLIS — Control Data Corp. has introduced an asynchronous, Teletype-compatible keyboard/CRT terminal for connection to CDC or other vendors' CPUs.

The CDC 752 is said to be a lower cost addition to CDC's 750 terminal series. It displays 1,920 characters on the CRT screen

## Terminal Transactions

and transmits information one character at a time at 10 rates from 110- to 9,600 bit/sec, CDC said.

Upper/lower case characters, connections for impact or nonimpact printers, a numeric keypad, blinking characters and reduced light intensity are standard features, according to the firm.

The CDC 752 also features a detachable keyboard; self-contained diagnostic test procedures; switch-selectable 64- or 96-character Ascii sets; RS-232C, CCITT V.24 or current-loop interfaces; and 33 displayable control codes.

CDC 752

The CDC 752 CRT can be purchased for $1,650 or leased for $55/mo on a one-year contract, CDC said from P.O. Box 0, Minneapolis, Minn. 55440.

## HP 2645 Keyboard Adapted For Swedish/Finnish Use

PALO ALTO, Calif. — Hewlett-Packard Co. has added a variation to its 2645 CRT communications terminal series with a character set and keyboard adapted for Swedish and Finnish applications.

Based on the HP 2645A, the HP 2645S can display special Swedish characters and has a rearranged keyboard that is commonly accepted in Sweden and Finland.

All of the 2645 series terminals offer teletypewriter compatibility, communications up to 9,600 bit/sec and up to 12K bytes of display memory and editing capability, HP said.

The microprocessor-controlled CRT station was designed for both local and distributed computing networks and has the optional capability of asynchronous or binary synchronous multipoint polling of up to 32 terminals on the same line.

The HP 2645S costs $3,750. Quantity discounts are available and deliveries are scheduled to begin in May, according to the company at 1501 Page Mill Road, Palo Alto, Calif. 94304.

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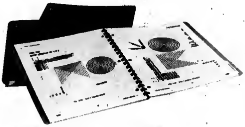

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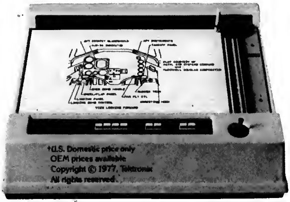

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### For Certain Applications

# Optical Mass Storage Expected to Rival Disk Storage

**By Esther Surden**
Of the CW Staff

SAN FRANCISCO — In the future, optical mass storage will rival today's disk and tape magnetic storage for certain kinds of applications, according to speakers at the IEEE Computer Society's recent Spring Compcon 77 here.

"A video disk read-only memory represents an economically attractive way to store, retrieve, duplicate and distribute large amounts of data," George Kenney, a researcher with Philips Laboratories told attendees.

Concurring with Kenney was Edward Kaczorowski of Precision Instrument Co. who said optical methods provide a permanent, compact, low-cost, two-dimensional medium.

Both speakers described projects involving this type of storage, admittedly in its technological infancy.

Kenney discussed an optical disk recorder with an on-line storage capacity of $10^{10}$ bits. The recording is made with laser, which makes very small pits in a thin film made of a material called tellurium.

#### Based on Entertainment System

The project was based on technology developed by N.V. Philips in The Netherlands for a home entertainment system, Kenney said. But many more constraints were put on the data-oriented project than were allowed for the home-oriented video disk system.

In particular, no processing of the disk was allowed, so the researchers had to come up with a method that was immediately readable after writing, he noted.

The team working on the disk chose tellurium as most attractive for sensitivity, resolution and archival storage, he stated.

The disk material itself was investigated and a kind of plexiglas was chosen. The team also had to come up with a means to protect the disk other than a clean room environment.

The tellurium was subject to scratches, dust and fingerprints, so an air-sandwich disk protective mechanism was developed, creating "essentially a miniature clean room" in the space between the two disks, he explained.

Developing a relatively inexpensive data recorder was also part of the project. In the one created, the disk rotates around a vertical axis and reading and writing take place from the underside of the disk, Kenney continued.

The access time for the system is reported to be less than 1 sec. and the researchers reached their goal of accommodating $10^{10}$ bits, he stated.

#### Optical Storage Needed

Commercial optical storage is needed for applications in which a large volume of data must be stored at low cost, Kaczorowski stated in his talk on optical mass storage.

Kaczorowski's firm markets such a memory called the PI 190.

One of the primary difficulties in developing this kind of storage is finding a transducer to record reliably on a small area of the media, he said.

But the optical media have other advantages. First, low cost can be achieved because optical media can use thin film applied to a simple substrate.

The retrieval mechanism is also simpler than today's magnetic head spacing and tracking sensors, he stated.

Optical media can also be durable and portable. "Common requirements of large data bases are that data be held for long periods of time at low cost without maintenance or data loss," he said, adding this fills the bill because the medium is not erasable so the original is not altered when changes are made.

"Changes are journaled and the update file is stored at a new location," he noted.

#### Metal Film and 'Datastrips'

The PI 190 uses metal film with data recorded by forming uniform holes in it. The holes are detected by examining the light reflected in it, he told the group.

"We record with a laser beam which melts a region. The melted area later bursts and pulls back to form a round hole," Kaczorowski said.

The unit records the information on "Datastrips" 31-1/2 in. long. The Datastrip itself is made of polyester. The data is organized in strips running the length of the strip, with the early part of each track containing information about identification, he explained.

The strips are stored in packs which ride on a translator, he noted. To read a particular strip, the translator is positioned so the strip is under a drum.

The strip is then pulled onto the drum and the reading process, using reflected light, takes place, he indicated.

"The reflected light indicates whether a particular data cell is occupied by a hole or a shiny region [representing the number 1 or 0]," he added.

### Off-Loading CPU Functions

# Micro-Controlled Peripherals Getting More Tasks

**By Esther Surden**
Of the CW Staff

SAN FRANCISCO — More and more functions are being offloaded from CPUs into microprocessor-controlled peripherals and this trend will continue, according to Robert E. Jackson, a consultant with Applied Computing Technology.

Speaking at the recent IEEE Computer Society's Spring Compcon 77 session on "Microprocessors and Peripherals," Jackson noted this trend is especially true of serial printers and keyboard CRTs which can and do operate as off-site terminals.

"With today's microprocessors, there is no reason that a printer could not decode a Fortran format statement and decide what to print, or a disk [could not] mush through several levels of dictionaries before transferring data," he said.

Such functions are not only time consuming for the CPU, but also are speed limited by the electromechanical peripheral. Micros could do them better, he stated.

More intelligence is being put into peripheral controllers, he noted. "Today's microprocessors are quite capable of controlling a disk, keyboard or CRT with minimal interface." More micros will also be incorporated into central computers, he predicted.

#### Challenging Years Ahead

For the designer working with microcomputers, the next few years will prove challenging. The first thing to understand is that it is "easier to teach a logic designer to program than a programmer to design logic," Jackson said.

After programming is mastered, designing with micros is not too difficult, he indicated. Micros have to be interfaced to a clock, memories and I/O ports which are typically supplied by most manufacturers.

"We tend to provide a separate I/O port for each subsystem," because each subsystem must be capable of being independently tested, he said.

#### Several Stimulation Tools

Several tools can be used to help the designer simulate the software in its intended environment, Jackson continued.

The first tool is called a "prototyping board," on which the program is stored in erasable programmable read-only memory.

The next "step up" replaces this difficult-to-use method with a read-write memory and a teletypewriter or CRT to change its content. With the addition of a resident assembler and a debug package, along with an "assemulator," the designer has the basic tools, he said.

Editors, program generators and bulk storage with file maintenance packages are also available, Jackson noted.

"The assemulator generally has the capability of operating in a background or a foreground mode at the 'flick of a switch'," he said.

#### Construction Begins

After completing the interface and obtaining the assemulator, program construction can begin and a preliminary flow diagram is developed. The preliminary chart tells how each subsystem should be exercised, he noted.

Once individual subsystems are tested and the time rules are established, programming can take place through more-detailed flow diagrams. The final diagram is translated into the final program, Jackson explained.

Although peripherals seem to be components when considered from the outside, they are more and more getting to be full-fledged systems themselves and are complicated by elements that all must work together, he emphasized.

# Cbema Reviewing DP Product Safety

WASHINGTON — The Computer and Business Equipment Manufacturers Association (Cbema) has established a subcommittee to examine the safety of DP equipment.

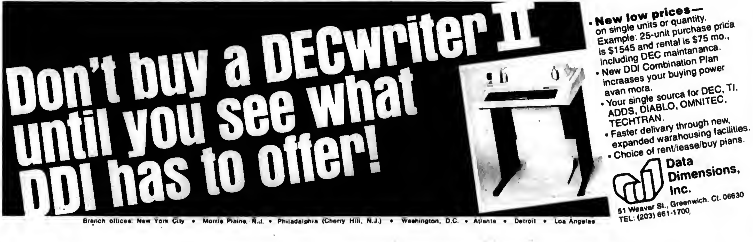
Cbema will review existing and proposed national and international standards as well as regulatory agency activities relative to safety provisions for DP equipment.

The ESC-2 task group will attempt to maintain an awareness of the standards for DP product safety set forth in Underwriters Laboratories UL-478, International Electrotechnical Commission IEC/435 and the Canadian Standards Association (CSA) C22.2 No. 154, according to ESC-2 Chairman Al Poch.

One of the specific goals of the group is to try to develop common international standards and have them integrated into the UL, IEC and CSA requirements.

Ideally, the task group would like language that is common to all standards, Poch continued.

Acceptance of common standards would allow DP equipment manufacturers to have the assurance that if equipment meets one standard, it will meet the requirements of the others too.



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# Security Firm Reduces Overtime, Errors, Costs With Key-to-Disk

CHICAGO — The implementation of a key-to-disk system has enabled Becker Securities to achieve savings in the form of cost reductions, increased productivity and reductions in errors and overtime.

Becker Securities recently made the transition from four IBM 029 card punches to two Entrex Corp. system 380s with eight keystations.

Becker's operations range from serving retail and institutional customers for securities transactions, firm trading for its own account, the commercial paper business, corporation finance and clearance and execution services for other broker dealers.

Under the previous system, Becker utilized the 029s to process between 1,100 and 1,200 records per day, according to a spokesman.

Because data must be out by 4:45 p.m. each day, whether or not it has been verified, only 40% to 50% of each day's data was verified. This left 70 to 80 pages of unmatched trades and approximately 140 rejects, he said.

Despite this, the data had to be processed, carrying many errors to the mainframe.

With the conversion to the Entrex system, using on-line editing and preprogramming capabilities, errors are caught at data entry time when they are corrected immediately, resulting in a reduction in unmatched trades of better than 90%, the spokesman said.

Some of the benefits that the firm is claiming since the changeover include a 60% decrease in employee overtime, a 30% increase in operator productivity, elimination of 50% of mainframe verification and a 30% reduction in the number of keystrokes, he added.

Future plans for Becker include an expansion of the configuration to include communication capabilities to transmit stock information to other U.S. offices, he concluded.

# Independent Add-On Memory Doubles Firm's 370/125 Limit

LYNCHBURG, Va. — The installation of an independent add-on memory system has allowed Imperial Reading, a clothing manufacturer here, to extend the memory capacity of its IBM 370/125 to a full megabyte.

The installation, the first of Intel Corp.'s In-7125 add-on memory system, effectively doubled the IBM 512K limit.

The system will be used in the full range of apparel industry applications, including general ledger, inventory, payroll and market analysis.

"With the price per byte and the ability to expand our 370/125 applications, we can now consider purchasing instead of leasing, as the expanded system can now meet our projected growth needs," according to Gordon Richardson, vice-president of corporate control.

"With the full megabyte enhancement, the In-7125 will place the memory capacity of our 125 near that of a 370/138," he continued.

The installation and testing of the plug-compatible add-on memory went smoothly, according to Richardson.

No software changes were required for the operating system or application program and there were no permanent changes to the CPU or resident memory, an Intel spokesman noted.

"When everything from raw materials and energy to labor costs more each month, we need to utilize every method to do things smarter.

"These productivity savings ultimately reach our customers and stockholders," he concluded.

# Information System Helps State Develop Its Natural Resources

BISMARCK, N.D. — A mainframe-controlled information and forecasting system is guiding North Dakota decision makers in developing the state's natural resources — a move designed to ease the nation's energy shortage.

The system is a network of line-printers and CRTs interconnected to the state's IBM 370/145 through which the state's Regional Environmental Assessment Program (Reap) is providing data to the Federal Bureau of Land Management.

The data is needed to determine the environmental impact of developing strip mines, coal gasification plants and pipelines in seven counties in the southwestern part of the state.

"Most people think that all we export is wheat. We also export a great deal of energy," according to Dr. A, William Johnson, director of Reap.

North Dakota is 90% agricultural, Johnson points out, but beneath the fields of wheat are an estimated 16 billion tons of strippable coal.

Some residents aren't sure coal development is worth the environmental and socioeconomic cost, Johnson observed.

"There's a great diversity of opinion about it." Reap is helping decision makers look into the future so they can better determine allowable levels of development, he said.

Reap is using several different applications in the scope of its operation.

The Reap Resources Reference System is an automated listing of about 7,000 citations about topics relating from the state's agronomy to its water.

An economic-demographic model is another part of Reap. It is used to forecast the impact of current and potential development on the economy, population, employment and public sector finance of the southwestern part of the state.

Reap is a speedy source of information, but it doesn't make decisions, Johnson noted. However, the system facilitates public decision making," he said.

It makes information available in minutes at a cost of hundreds of dollars while the manual method may take months and cost thousands of dollars, he added.

The state Legislative Assembly created Reap in 1975 at a cost of $2 million and financed its operation with a tax on coal.

"Reap's reward is informed and effective decision making for the people of North Dakota," Johnson concluded.

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## *'Flexible and Exciting Medium'*

# COM 'Files' Can Exhibit Random-Access Characteristics

**By Dennis J. Streveler**
Special to Computerworld

**Mref:** $\underbrace{\text{6.309}}_{a}\text{-}\underbrace{\text{014}}_{b}\text{.}\underbrace{\text{L12}}_{c}$
**Guides:** a b c

Fig. 1. Microfiche Reference Pointer

10/25/76 ACME PRODUCTIONS FR: 1060356-1
STFP45 TRIAL BALANCE TO: 1067632-3 6.309-014

Fig. 2. A Suggested COM Title Area.

It seems like we are set on making the same mistake again. Heaven only knows how many DP shops there are around the world that still consider disk as just another form of tape for I/O.

Such a misuse of resources is unthinkable to most information scientists, yet the industry seems quite content to make the same mistake with the most flexible and exciting medium to come along in many a moon — computer output microfiche (COM).

More and more shops in widely varied environments are following the lead of banking and moving toward COM.

Too often a COM recorder is treated as simply a line printer replacement, overlooking the fact COM has random-access qualities, just as disk over tape does.

Like a disk file, a COM "file" may have a "key." One such key is dubbed a Microfiche Reference Pointer or "Mref." (See Figure 1).

An Mref is composed of three guides:,

(a) Generation — The date of creation of the microfiche file. (Using a Julian date will minimize the use of character positions in the visible title area of the microfiche.)

(b) Fiche Number — For a massive microfiche file, four (or more) digits may be necessary.

(c) Grid Position — The actual grid position where the information resides on the microfiche. The format of this guide depends somewhat on the microfiche reduction ratio used.

With such a system, it is possible to go directly to the information you need with no searching. Simply:

- Locate the correct generation of the file using guide a.
- Locate the correct fiche using guide b. Both guides a and b should appear in the title area of the microfiche (See Fig. 2).
- Position the reader's pointer using guide c.

Thus, the information is immediately located and scanning of all indices is bypassed.

This method has even greater utility when the microfiche file is in a sequence other than that which is appropriate for all accesses. In this design situation, the need for costly crossreference indices can be eliminated.

Here are two examples of the use of the Mref:

- Transactions are posted to an account and shown on a COM transaction register.

A companion on-line query system displays an Mref into this COM file pointing to the location in the COM register where the latest transactions for this account can be found.

By integrating COM files with on-line systems, improved information retrieval capabilities can be realized.

- In many microfiche files, facilities which allow "backtracking" can be valuable. This concept is somewhat analogous to the backward pointer in a two-way chained disk file.

For example, if the most current COM-archived facsimile of an account's statement were to include an Mref to the facsimile of the account's previous statement, one would be able to easily "leapfrog" over unwanted information.

This is useful when there can be a time lapse between successive "records" in the microfiche file, e.g., revolving accounts which regularly sustain periods of financial inactivity.

The actual calculation of the Mref is simple and uses a minimum of computing power. The generation (guide a) is extracted from a date card, the system date, etc.

The fiche number and grid location (guides b and c) can be generated through a simple transformation of the COM report's "page numbers" (which are generated just as if the report were destined for a line printer).

The transformation requires two modulo divides which are easily implemented in Cobol using DIVIDE . . . REMAINDER constructs. The transformation algorithm can then be subroutined (input page number, output Mref).

The Mref requires only 13 print or display positions and, more importantly, is frugally represented internally in the computer. As implemented on a Burroughs Corp. medium system, the Mref requires only 7 bytes of memory.

Paper savings can be one way of justifying the use of COM in many applications and environments. However, COM has potentials far greater than merely being a paper and storage saver.

A COM report should more aptly be termed a "microfiche file." In fact, it can exhibit characteristics of a random-access file.

*Streveler is systems engineer at Straub Clinic & Hospital in Honolulu, Hawaii.*

## SDC Pepe Wins Award

SANTA MONICA, Calif. — System Development Corp. (SDC) has been presented with an Engineering '77 Project Achievement Award for its work on the Parallel Element Processing Ensemble (Pepe) supercomputer which was delivered to the U.S. Army late last year.

The award was given by the Institute for the Advancement of Engineering, Inc., for the system that was designed by SDC and built to SDC specifications by the Burroughs Corp.

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With minimal training, non-technical personnel can implement data processing applications that guarantee virtually error-free input. Our Editor language, a straightforward COBOL-like language, dramatically reduces the lengthy process of report definition, design, programming and debugging. Additionally, the 600 Series provides a wide variety of flexible utility programs to further simplify the process of information utilization.

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# Bits & Pieces

## Printers Built For Sensitive Use

WOODLAND HILLS, Calif.— Dataproducts Corp. has developed a family of line printers which meet military requirements for government communications security.

The printers were designed for use in any data system handling either classified or sensitive information.

The printers provide 136-column printing at speeds of 300 line/min (Model 2237), 600 line/min (Model 2267) and 900 line/min (Model 2297).

Prices begin at under $15,000, Dataproducts said from 6219 De Soto Ave., Woodland Hills, Calif. 91364.

## DEC Adds Interactive Graphics System

MAYNARD, Mass. — Digital Equipment Corp. has brought out the GT41, an addition to the Decgraphic-11 family of interactive computer graphic systems.

The GT41 combines a PDP-11/04 minicomputer with 16K words of MOS memory and a VT11-A graphic display subsystem in a self-contained tabletop unit.

It has a 17-in. refresh graphics CRT, a light pen and a display processor with built-in read-only memory bootstrap for downline loading from a host CPU.

Communications between the GT41 and the host is through an asynchronous interface, the company said.

### Ascii Keyboard

The system includes a full Ascii keyboard. The VT11-A display subsystem features eight intensity levels, four line types, italic letters and 31 special Greek and mathematical symbols, the company claimed.

The GT41 sells for $18,000, with deliveries scheduled for the second quarter, DEC said from Maynard, Mass. 01754.

GT-41 Graphics System

## Elographics Data Entry System Handles Graphs, Forms and Menus

OAK RIDGE, Tenn. — Elographics, Inc. has developed a data entry system based upon a pressure-sensitive tablet that it said allows users to enter position-dependent information from graphs, forms and menus into DP systems.

The E250's tablet, which is under the user's system software control, is divided into separate sensitive areas from each of which a unique character code can be generated, a spokesman said.

### Types of Sensitivity

The sensitive areas can be arranged in any configuration and models can be supplied which are sensitive to finger pressure or to sharper styli such as ballpoint pens or pencils, he added.

Interfaces designed into the digitizer permit the unit to be plugged directly into terminals, card punches, calculators and minicomputers for accumulating and processing data, the firm claimed.

The user-defined format of the menu permits the unit to be used for extracting information from forms and for coding large arrays of data and control information not possible with keyboards, it said. Uses include industrial, commercial, process and inventory control.

E-250 prices begin at $2,990. Elographics is at 1976 Oak Ridge Trnpk., Oak Ridge, Tenn. 37830.

Pressure Pad In Use

## Statos Option Offered

PALO ALTO, Calif. — An option allowing users the choice between 100- and 200-dot/in. resolution is being offered by Varian Associates' Graphics Division for its Statos Series 42 printer/plotter.

The dual-density option is available on Statos Series 42 equipment in 8-, 11-, 14-7/8- and 22-in. models and in both high- and low-speed configurations.

The option is priced from $1,500 from Varian Associates Graphics Division, 611 Hansen Way, Palo Alto, Calif. 94303.

## DP Guide Available

WATERLOO, Ont. — Computing Elements Development has a reference guide for the first-time computer user or for anyone involved in installing computer systems.

The guide includes information on selecting hardware, software and personnel and how to design vendor contracts and forms.

Included is a discussion of industry trends and the latest technology.

The guide is available for $5 from the firm at 277 Hazel St., Waterloo, Ontario N2L 3Pl, Canada.

## Sycor Printer Bows

ANN ARBOR, Mich. — Sycor, Inc. has introduced a 300 line/min printer designed for remote printing requirements.

The Strider is available on Sycor's 300, 350 and 400 series terminals and data entry systems. It uses a rotating belt mechanism to print the standard 64-character Ascii set on pin-fed, fan-folded paper, with a 10 char./in and 6 line/in format, Sycor said.

Strider costs $12,000 or $410/mo, including maintenance, on a one-year lease. Deliveries will begin in April, Sycor added from 100 Phoenix Drive, Ann Arbor, Mich. 48104.

## Cases Hold Printouts

GRAND RAPIDS, Mich.— Walnut wood cabinets with dimensions keyed to ring binders and DP printout books have been introduced by Nucraft Furniture Co.

The storage cases have interior dimensions that will hold two rows of standard three-ring binders and/or DP binders on adjustable shelves, the firm said.

Capacities are 20 2-in. DP binders or 32 2-in. ring binders or 16 ring binders and 10 DP printout binders. Sliding wood doors and locks are optional.

Prices begin at $234. Nucraft is at 1615 Eastern S.E., Grand Rapids, Mich. 49507.

## Macro Cuts Cost Of Printer Units

LONG BEACH, Calif. — Price cuts on four Honeywell Information Systems, Inc. compatible line printers have been made by Macro Products Corp.

The reductions will save end users 28% to 51% of the list cost of comparable HIS printers and up to $5,505 of Macro's previous prices, according to the firm.

The 600 line/min M-260 now costs $21,890, the 900 line/min M-290 is $25,550, the 1,200- to 1,800 line/min M-470 is $34,450 and the 1,500 line/min belt-type M-550 is $36,995.

### Price Comparisons

The M-550 is now priced $39,125 below the cost of the HIS PRU-1600 and $5,505 under Macro's old price. The M-260 now costs 36% less than the equivalent HIS PRU-0600, the firm claimed.

Standard maintenance and lease purchase contracts are available. Macro is at 3110 E. Willow St., Long Beach, Calif. 90806.

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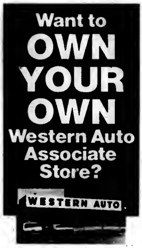

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# MINIWORLD

## Mini Bits

### *Intelligent Controller Added For Magnetic Tape Systems*

ROCKVILLE, Md. — An intelligent magnetic tape drive controller designed for minicomputers and microcomputers is available from Quad Systems, Inc. (QSI).

The Model 7700 controller is microprocessor-based and contains both hardware and software to allow control and communications with up to four IBM format-compatible tape drives with 80M bytes of storage, QSI said.

The utility and control routines located in the controller can be accessed through a high-level language call, the company explained. The controller also features error-checking and automatic error-recovery routines.

Communications via an RS-232C port is also available, a spokesman added.

The controller with a 9-track, 800 bit/in. tape drive costs $7,500 from QSI at 11900 Parklawn Drive, Rockville, Md. 20852.

### Controller Provides Link Between Printers, HP 2100

ORANGE, Calif. — MDB Systems, Inc. has a line printer controller for Centronics Data Computer Corp., Dataproducts Corp., Data 100 Corp. and Data Printer Corp. printers to allow the units to interface to the Hewlett-Packard 2100.

The controller is compatible with the host system's diagnostics, drivers and operating system, the vendor claimed. It is contained on a single printed circuit board requiring one slot in the HP chassis.

The controller ranges in price from $850 to $1,250 depending on the line printer model selected, the company added from 1995 N Batavia St., Orange, Calif. 92665.

### Printer for IBM 3 Offered; Runs at 1,500 Line/Min

HORSHAM, Pa. — A 1,500 line/min printer for the IBM 3 is available from Decision Data Computer Corp.

The Model 6615, designed to replace the 5203 and 1403 printers currently used with the IBM 3, features chain-train technology and includes a reversible band which can contain a different character set on each side, Decision Data said.

The printer has 132 print positions and a 48- or 63-character set; it prints on forms with up to six parts. It costs $1,495/mo, including maintenance, on a three-year lease or $45,750 to purchase.

The printer will be available in May from the vendor at 100 Witmer Road, Horsham, Pa. 19044.

### *For Networks of Minis*

## MIT Working on Distributed Design Tool

**By Esther Surden**
Of the CW Staff

SAN FRANCISCO — A tool to help designers develop distributed networks with minicomputers is being created as part of general research at the Massachusetts Institute of Technology, according to Hoo-Min D. Toong, assistant professor of electrical engineering and computer science.

Speaking at the recent Spring Compcon 77 here, Toong said "most distributed systems are one of a kind, and heaven forbid the design should change while you are designing the system."

The need for a design tool that can be generalized to different kinds of distributed minicomputer networks has become evident as microprocessors and hardware in general come down in cost, he said.

People want to find ways of using five to 20 micros or minis in a system, he noted, but no common tools are available to help them do this.

#### Requirements List

The work at MIT is centered around developing a requirements list for designers so "if they can match the requirements we identify, they can design a multiprocessor system," he explained.

Among the areas being examined are higher level languages, modular hardware, emulation facilities and software development tools, he said.

As part of the general research, Toong studied the commonly known methods of configuring systems with many minicomputers. The star, ring and shared-bus arrangements were researched in an effort to understand the hardware and software implications of each type.

"The study of these three basic structures is of major significance since it is contended that a vast majority of distributed processing problems can be solved through the appropriate application" of one of them, he said.

#### Search for Link

Part of the research, and the part reported in the paper presented at the conference, has centered on the attempts of the researchers to find a generalized link for various types of processors in a minicomputer network.

The paper outlined the researchers' attempts to develop a communications mechanism offering bandwidth communications inexpensively, Toong said.

A method was developed for only the ring and star configurations because the shared-bus approach was considered inadequate for most loosely coupled multiprocessing, he said.

"There is some hardware contention that limits the number of micros or minis that can get on the bus," Toong explained. "In fact, some studies indicated that between one and a half and two processors can share a bus before they contend."

With the necessary software for networking, the contention can "drop below one. So there is some indication that from two processors you get less than one" with this approach, he said.

#### Serial Interface

Determining that almost all minicomputers can be easily equipped with a serial

*(Continued on Page 50)*

## Company Puts Money on Mini For Accuracy of Lottery Tickets

**By Esther Surden**
Of the CW Staff

ATLANTA — When a DP shop is in charge of verifying the accuracy of most of the lottery tickets produced on the East Coast, quality control is the most important consideration.

A minicomputer at Scientific Games Development Corp. here is performing this function along with other lottery-related applications. It is a dedicated system; to ensure accuracy, it must be dedicated, according to Jim Dorin, program director.

"We verify that the games we are producing do in fact contain the exact specified number of winners — both low-level and high-level — and that the quality of the games adheres to our specifications," Dorin said.

"We proofread, through the computer, every single number and letter," he added.

The second job of the firm's system is to give information to the participating states so they can validate tickets submitted to them by the winners.

"We pass along information in the form of reports and tape files. The states can refer to both the printed listing and the tape file to know whether a ticket is valid and unaltered," Dorin explained.

Scientific Games has an 80K-word Data General Corp. Eclipse S200 operating under RDOS with one 10M-byte Diablo disk drive, two tape drives, a 300 line/min Dataproducts printer and three Lear Siegler, Inc. CRTs.

The tickets are checked by an army of proofreaders working from books generated by the minicomputer. The printer supplies the company with the photographers' proofs from which the proof books are generated, Dorin said.

The company "supports" the individual state lottery efforts by supplying a claims-validation process for the states to run on their own systems.

When a person submits a ticket for validation, the system checks it for accuracy, makes sure the name, address and Social Security number are reported and ascertains whether the ticket should be paid. The system also issues the check. Scientific Games supplies the software for this, Dorin indicated.

The tape that allows the state lottery officials to check tickets for validity is produced on the Eclipse. Since the output is not directly compatible with other systems, "I do go through a conversion process,"

*(Continued on Page 50)*

## *Galaxy/5 Speeds Enhanced*

WALKERSVILLE, Md. — Enhancements that reportedly double the processor cycle time and increase the main memory speed of the Galaxy/5 large-scale minicomputer have been announced by its vendor, Digital Systems Corp. (DSC).

The cycle time for executing a microinstruction is now 300 nsec compared with 600 nsec previously, according to a spokesman. Execution of variable-length macro instructions now takes 3 microsec, the company said.

Main memory speeds have been doubled at the micro level and have decreased from 800- to 500 nsec at the macro level, the company said.

Present users can upgrade to the enhanced processor speeds for $1,500. The upgrade is "a plug-in/plug-out" operation taking about 5 min per board, the spokesman noted.

The enhanced processors and memory will be included on all Galaxy/5 systems in production, the firm said, adding the price of the system will remain the same.

Present Galaxy/5 users can get the memory upgrade when they order more memory for their processors, the spokesman explained. The enhanced memory includes 64K bytes on a single board.

A typical Galaxy/5 system with 64K of memory, one channel that can accommodate 15 I/O devices, 67M bytes of disk, a 200 line/min printer and seven CRT terminals costs $69,000, DSC said from its headquarters in Walkersville, Md. 21793.

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# MIT Working on Tool to Aid Design of Distributed Networks

*(Continued from Page 49)*

interface, the researchers chose a medium bandwidth serial connection scheme. Another reason for choosing this method was that only three wires had to be run from each minicomputer to the control node, Toong noted.

In addition, telephone line compatibility over voice-grade lines up to 9,600 bit/sec is available using this method, he said.

The resulting research developed Micro-star, a microprocessor-based control mechanism complete with networking software. The control mechanism meets the criterion of cost effectiveness while allowing for problem-specific processing of data in the channel during actual transmission, he claimed.

"These features are achieved with extreme simplicity of software and hardware," he added.

In addition to the research in communications, Toong reported the development of a portable microprocessor-based terminal suited for network diagnostics that can fit into an attache case.

# Ticket Maker Places Its Money on Mini

*(Continued from Page 49)*

Dorin stated.

"The DG system is an Ascii system and most of our customers are Ebcdic because it is the industry standard. So before I can send the tape out, I have to convert from Ascii to Ebcdic and I also have to block it so all the data will fit on one tape," he said.

The company does not do any of the initial game generation with the system and so doesn't have that big of a security problem,. Dorin noted.

The algorithms for choosing the lottery tickets are determined over a time-sharing network and all the program development is also performed that way, with the system elsewhere, he indicated.

Responsible for this end of the programming is Dr. John Koza, the company's founder, who generates a tape which is then sent to Atlanta by airplane from which the shop begins to make its validation listing.

"The printer also gets a copy which goes directly into a computerized typesetting process. There is nothing in-house that can be used to help construct the tickets," he noted.

The firm chose the DG system on the recommendation of an OEM in the Atlanta area, Dorin stated. Scientific Games moved to the area to be close to the printer of the tickets.

There have been some hardware problems, but "field support in this area is very good," he stated. "We look primarily to our OEM for system software support."

### Turnkey Handles Inventory

RESTON, Va. — A turnkey minicomputer system based on the Westinghouse 2500 is available from Dynamic Computers, Inc.

The system performs order entry, inquiry, inventory control, sales analysis and payroll, the firm said. All programs are written in Fortran.

A basic system with 64K of core, one formattable CRT, 5M bytes of disk and a line printer costs $40,000. It can be expanded to 4M bytes of core and can accommodate up to seven remote terminals, a spokesman added from 11800 Sunrise Valley Drive, Reston, Va. 22091.

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## Improves Merchandise Control

# Fortunoff Merges POS and EFT in Mini-Based System

**By Vince Sabia**
Special to Computerworld

WESTBURY, N.Y. — With customer service and merchandise control the main objective of Fortunoff's DP plan, our firm has found a way to merge point-of-sale (POS) and electronic funds transfer (EFT) in a minicomputer-based system.

Fortunoff is a medium-size retailer specializing in jewelry, silver and home accessories, with stores in Long Island, N.Y.; New York City; and New Jersey.

In 1969, realizing the advantage of capturing data "where the action is" — at the cash register — we installed paper tape-producing cash registers and proceeded to capture our productivity, commission, sales audit and, most important, merchandise sales information.

Although this method was cumbersome, it did the job in providing accurate merchandising and financial data and prepared us for the long-awaited electronic cash register.

In 1974, the first electronic registers were installed on-line to a minicomputer, and the company could envision the many opportunities afforded us in attaining better and better customer service.

As more mechanical registers were replaced by electronic registers, negotiations were begun with the equipment manufacturer and Chase Manhattan Bank's BankAmericard Division to develop a system jointly to provide BankAmericard credit authorization via the cash register.

At this point, it was quite clear that the most efficient EFT system from a retailer's point of view must be through the old faithful cash register, not via separate devices, pads or telephones.

It was also clear that the banking community could never, either because of legal restrictions or self interest, join in a mutual service to help the retailer provide all-inclusive bank card authorization.

We found that a marriage must be consummated among the banks, the equipment manufacturers and the retailers if the EFT concept was to be. The retailer must be the catalyst in forming this union.

Obviously, the whole concept of EFT is for the benefit of the consumer and the retailer who, through many years of experience, is in the best position to serve the consumer.

### Authorization Link Completed

By 1975, the authorization link was completed and for the first time the retailer, who did not have control of his credit data in house, could now offer the same speedy credit card service as the giant retailers.

Naturally, the success of this system brought the Master Charge banks to our door eager to establish their link for Master Charge authorization.

This link should be in effect by the end of this year, but the important point is that the control is at the retailers level and it is a means of bringing two giant financial institutions together to provide good customer service.

Meanwhile, Fortunoff proceeded to upgrade all its cash registers to electronic, thereby increasing the number of its departments on inventory control and offering speedier credit card sales processing.

Recognizing the need and the advantage of this system to small retailers, Fortunoff proceeded to form a service bureau and offer this service to other retailers.

We recognized that retailers were mainly interested in merchandise and sales information, but credit card authorization was the "icing on the cake." The charge for such a service is as low as .01 cent per transaction to the retailer depending on volumes.

The system utilizes NCR 280 cash registers hard-wired to an NCR 751 store-level data collector and modem.

Each store is bridged to a central Bell Telephone bridge and connected to an NCR 725 minicomputer with 32K memory.

The NCR 725 mini is on-line to an IBM 7 which in turn communicates to an IBM 370 computer both located at the BankAmericard center 20 miles away. Response time averages 4 sec.

At store closing, sales audit and register balancing reports are produced along with flash sales reports utilizing an NCR Century 200 in batch mode. All data is accumulated and various weekly and monthly merchandising reports such as store, department, class, salesman's productivity commission reports and mark down reports are printed.

This type of service gives the banking community the opportunity to build an EFT network and be paid in the process, a concept which has eluded many financial institutions presently involved in EFT networks.

It also provided the financial institutions with the one ingredient missing in their EFT systems plan — retail systems knowledge. Our network has grown to over 150 cash registers communicating from 11 different stores.

*Sabia is vice-president/director of management information systems at Fortunoff in Westbury, N.Y.*

# Airline's System Idling Supports Job Placement

**By Esther Surden**
Of the CW Staff

CANTON, Ohio — Great Western Placement, Inc. here grew out of idle time on a Great Western Airlines small-scale system and an aviation industry need, according to the system's programmer, Steve Sheline.

The company, which serves as an employee placement service for the aviation industry, was formed to "use downtime on the Honeywell [Information Systems, Inc.] 62/40 system" recently installed at the airlines, Mike Metcalf, director of the placement program, said.

It also solved the firm's problem of locating employees to meet its requirements, he noted.

Previously, the company used the usual methods of locating workers, but results were slow because of the number of work categories.

Now, Great Western maintains a data bank of resumes, not only for its own use, but for the use of other airline employers.

People who want their names and abilities placed in the file simply write or call a toll-free number, Metcalf said.

An employee information sheet with more than 70 categories is forwarded to the inquirer who then completes and returns it to the service with a fee to cover programming and file maintenance expenses. The data is stored a minimum of two years, he explained.

The equipment used includes the 72K 62/40 CPU with two disk drives, two tape cassette input units and a 400 line/min printer.

The department is currently converting from card to off-line key-to-cassette, using a Sycor Corp. CRT unit, Sheline said.

The system runs the general business applications of the airline as well, he added.

"We have general ledger and accounts payable, of course," he said. A fuel system keeps track of charges made from the credit card companies and route accounting allocates costs and profits to different aircraft.

The firm switched to the HIS system from an IBM 3 about a year and a half ago.

Western worked out an agreement with HIS, who could not immediately supply a system, to run its programs at the HIS office using its system, Sheline explained.

The 62/40 was "finally acquired in March," he added. It is rented for about $2,500/mo.

The tape-to-cassette procedure has simplified things, and now the airlines and placement service can keep much longer records in one place, Sheline said.

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## *At Sea and on Land*

# Minis Aid Woods Hole Oceanographers

WOODS HOLE, Mass. — Minicomputers are helping scientists at the Woods Hole Oceanographic Institution here advance their understanding of the ocean as a system.

Studies of the physics, biology, chemistry, geology, geophysics and acoustical properties of the marine environment rely heavily on the small computers.

The use of minis aboard research ships for collecting and analyzing data is vital to modern oceanography, according to the scientists involved. A complement of 15 Hewlett-Packard Co. minicomputers serves many of the at-sea and on-shore needs of the ocean research being conducted here.

### Three Vessels

The institution's three large research vessels remain at sea most of the year, ranging from the Labrador Current to the Gulf Stream, the Mediterranean, the Indian Ocean, the Black Sea and the Pacific.

The Shipboard Computer Systems Group of the Ocean Engineering Department operates four essentially identical sea-going minicomputer systems. Usually, one is on each of the three ships — Atlantis II, Knorr and Oceanus — and the fourth is ashore for program development.

The standard configuration includes 16K words of memory, two direct memory access channels that are software-assignable, hardware to perform integer multiply and divide operations and 14 priority interrupt I/O channels.

Standard peripherals include paper tape input and output; dual flexible disk drives; two 9-track magnetic tape drives; CRT character terminals; line printer; and digital plotter.

In addition, a graphics CRT with hard-copy unit is available for special cruises and a card reader is available on the shore system. Various general-purpose interfaces are also available for interconnection with scientific instruments.

### Geophysics Research

Minicomputers are used in marine geophysics studies for at-sea acquisition and processing of seismic, magnetic and gravity data. The systems combine this data with precise navigational fixes, associating each physical data point with a location.

Vast amounts of data are checked, edited, recorded and profiled. An important part of this process is manual inspection of data points using multipass editing and display programs.

The system allows graphic displays of the data in many forms. It acquires and analyzes seismic measurements recorded from surface and ocean-bottom receivers.

Other uses of the minicomputer in this research area include locating microearthquakes from buoyed hydrophone arrays and real-time navigation with active and passive transponder nets.

Another application is in studies of the earth's crust for evidence of continental drift and sea-floor spreading.

A typical experiment involves measuring the earth's magnetic field using a magnetic sensor towed 600 feet behind the ship. The mini takes readings at 1 min intervals from the precision sensor while also recording date and exact time from a real-time digital clock.

It checks the collected data and helps determine correct readings and discard erroneous ones. This data is later combined with precise satellite and navigational data taken to present a total experiment picture.

**Getting and keeping timeshare business:**

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# Plight of Small, Medium-Sized Businesses Highlighted

## • Hart Urges Federal Reforms

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Calling on his own political party to reexamine the appropriateness of "New Deal economic principles" in today's economy, Sen. Gary W. Hart (D-Colo.) recently questioned the nation's present trend toward the concentration of economic power in the hands of a few corporations.

Corporate concentration "is not simply a product of free enterprise" but "a frustration of that principle," Hart told the Fourth Annual Caucus of the Computer & Communications Industry Association here, adding that big government helps big business to power in many areas.

To remedy the role government now plays in the economy, the senator urged Congress to consider deregulating a number of industries.

Hart also wants Congress to revise the tax code so it doesn't frustrate the small competitor, to pass legislation which will distribute available loans and subsidies more equitably among businesses of all sizes and to make government research and development support and policies fairer as well.

"Changes should be made in these areas with an eye toward encouraging the development of healthy small and medium-size businesses," he said.

Hart suggested that outmoded tools from the 1930s and 1940s, Franklin Roosevelt and the New Deal era cause the President and Congress to continue to patch up "a very leaky economic ship of state with more tax rebates and more short-term incentives . . . without readdressing the long-term problems" underlying today's economy.

One of those problems, in Hart's view, is the concentration of economic power.

In the 20-year period between 1954 and 1974, the U.S. economic base at the top of its business pyramid shrunk from 500 corporations to fewer than 200.

"As we entered 1975, the top 200 corporations on Fortune's 500 controlled two-thirds of the manufacturing assets in this country and three-fifths of the sales, the employment and the net income after taxes," the senator noted.

"At this same rate, the top 200 corporations by 1980, just three years from now, will control three-quarters of everything, or roughly the share now held by the top 500," he warned.

Gary W. Hart

Corporations have political power, too, Hart said. Investments abroad impact foreign policy.

"Corporate power can frustrate the legislative process through the immense amount of money that can be put into lobbying efforts," he added, citing AT&T's Consumer Communications Act. The act was designed "to extend Ma Bell's monopoly to the only two areas where consumers have a choice of suppliers" — terminals and private intercity business lines, he said.

(Continued on Page 54)

## • Bentsen Proposes Incentives

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — The way to achieve U.S. economic objectives — be they the creation of jobs, the growth of new business or the development of energy sources — is to provide incentives for which private enterprises can compete, Sen. Lloyd M. Bentsen Jr. (D-Texas) believes.

Not everyone believes in incentives, the senator told the chief executives of the companies in the industries that make up the Computer & Communications Industry Association here recently.

Incentives are often equated with tax "loopholes" — to the detriment of small and medium-sized businesses, he said. Opponents to an incentive system consider such a device a tax expenditure.

For them, the only way to achieve an economic objective for this country is to have a government bureau hand out money as a direct subsidy or as a grant, Bentsen stated.

Citing England as an example of what happens when the government steps in to monitor the flow of capital after taxing investment income up to 90% and calling the private enterprise system a failure, Bentsen warned his listeners the same thing can happen in the U.S. The tax on investment or "unearned" income — like stock dividends — is already 70% here, he noted.

Lloyd M. Bentsen Jr.

Few people want to invest their money at so high a price, Bentsen suggested. "There are risktakers and caretakers in this country of ours, and if you don't leave something for the risktakers, there's not going to be anything left for the caretakers to care for," he said.

Increasingly, money is only invested in "the sure thing" in the U.S., the senator stated. In 1963, 70% of the dollar volume on

(Continued on Page 58)

# Remote Computing Seen Attaining Prominence

MINNEAPOLIS — "The distinctions between a remote batch business and a time-sharing business are rapidly disappearing and the majority of these vendors is in both areas — or more simply, in remote computer services," according to a report by Info-Dyne, Inc.

Control Data Corp., IBM and Univac are the main hardware suppliers in the remote batch services area, the study found, while Honeywell, Xerox and Digital Equipment Corp. are primary in time-sharing.

Info-Dyne noted much mixing of systems and devices is evident in the remote services industry and the trend is for vendors to operate one or two "supercenters" with a network of on-line data terminals rather than maintaining several more or less autonomous service centers.

Most vendors offer custom operating systems and custom-designed links between minicomputers and various CPUs, Info-Dyne said, and multiple languages are widely supported.

"Shared files between CPUs and between conversational and [remote job entry] users are increasingly evident, spurred on in part by great emphasis on proprietary data base management systems," the report said.

In terms of applications, many of those offered are either purchased from software houses or acquired from users, with the exceptions being in the areas of data base management and financial analysis where the tendency seems to be to offer proprietary general tools, Info-Dyne reported.

### Varied Pricing Schemes

"Pricing schemes and contractual agreements are as varied as the wide range of services and packages offered by the vendors. Special discount deals are possible with all of them, however, usually for larger significant users," the report stated.

A survey of users revealed that the large user companies are increasing efforts at strong administrative control of outside services, leading to internal coordinators and specific steps taken to reduce outside remote computing services expenditures, the report said.

Some users are already quite self-sufficient in-house and others are working toward it, the report noted.

Still, remote computing services users are directly benefiting from better performance, wider variety of offerings, improved documentation, faster and more consistent response, better reliability and easier access to the services.

"Cost variations are dramatic, however, and the variety of offerings and price schedules from the service vendors present constant questions concerning the best source or sources of service.

"This, coupled with advances by manufacturers of equipment, software houses and communications services, presents significant opportunities and challenges to the user searching for the most cost-effective solution," Info-Dyne observed.

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## And Nelson Asks White House Meet

# NBS, SEC to Study Their Impact on Small Businesses

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C.— Senators Lloyd M. Bentsen Jr. and Gary W. Hart (see Page 53) aren't the only ones concerned about the fate of small and medium-sized businesses.

The Department of Commerce's National Bureau of Standards (NBS) and the Securities and Exchange Commission (SEC) have announced an experimental project to monitor the impact their regulations have on the ability of certain businesses to secure capital funding.

And in Congress, Sen. Gaylord Nelson (D-Wis.) recently introduced a resolution which recommends that President Carter convene a White House conference on small business to help stem any further decline of this segment of the economy.

"Capital markets which supply financing to small, technology-based firms, such as manufacturers of electronic components . . . and computer equipment, have shrunk in recent years," Commerce Secretary Juanita M. Kreps and SEC Chairman Roderick M. Hills said in announcing the joint NBS-SEC plan.

"These firms, which are heavily dependent on equity financing and stand to lose when equity markets dry up, must necessarily be concerned by any reductions in funding that may result from securities regulations," they added.

To discover whether this hypothesis is true, the SEC, working under NBS' Experimental Technology Incentives Program (Etip), will establish an experimental monitoring system to obtain timely information on the impact SEC regulations have on small businesses and their ability to raise money.

The benefits and costs of a regulation will be analyzed simultaneously so its net effect on businesses can be assessed soon after the regulation is implemented or changed, Kreps and Hills explained.

The aim of the NBS-SEC project is to lighten the regulatory burden on the small businessman by avoiding unnecessary regulations, according to Kreps.

"If successful, the format of this program could be adapted to facilitate the ongoing monitoring of virtually all major SEC regulations," Hills stated.

### Conditions Threaten Survival

Meanwhile, Nelson, who chairs the Senate Small Business Committee, hopes to call national attention to the conditions "that ultimately could threaten the survival of small business."

Citing research and investigation by the Small Business Committee which included more than 107 days of hearings since December 1974, Nelson said the tax structure discriminates against small companies.

In addition, he said, regulatory policies stifle innovation, paperwork demanded by the government costs small firms more than $20 billion a year, finance opportunities are shrinking, large corporate competitors are engaging in predatory practices against small firms and there is an inadequate representation for small business in federal economic and regulatory bodies.

"We have developed a large number of initiatives in the Small Business Committee to change this situation, and many have met with success," Nelson said, calling attention to some tax relief for small corporations, the reform of the federal estate tax and the creation of the federal Paperwork Commission.

"But much more needs to be done," the senator warned. "One of the most important things is to alert the nation to the situation and to bring to bear on small business problems the best analytical capabilities and energies of our most creative and talented people in the academic community, the foundations and the business world."

## Hart Wants Reforms For Small Business

(Continued from Page 53)

"A public policy on telecommunications will affect not only the telephone industry, I think it will almost affect every area of our lives. Even if AT&T could provide adequate innovations at the lowest cost to the consumers, even if we have the best phone system in the world . . . serious questions still remain as to whether that's the course we want to pursue," Hart stated.

One restraint on the growth of corporate power is the nation's existing antitrust laws. "It's certainly been easier to apply the antitrust laws to price fixing and areas such as that . . . than to apply them to instances of market power and market manipulation," he said.

Again, economic power becomes political power when a corporation spends tens of millions — if not hundreds of millions — of dollars in defending itself against charges of antitrust violations. Such cases last for years with no resolution and drain everyone's resources, Hart said, referring to the Department of Justice suit filed aginst AT&T in 1974.

Government regulations, in Hart's view, are appropriate and necessary where they protect public health and the environment. He stressed, however, that they should not stifle competition.

"Wherever possible, regulations should work to change the marketplace so the corporation's balance sheets reflect the cost to society of polluting the environment and also the profits to be made from cleaning up that pollution," for example, Hart said. "There should, wherever possible, be material incentives for firms to constantly seek better methods of production."

Small companies should not have to bear the burden of government regulations. They should not have to pay as much as 48% of their income in taxes when large companies pay an average rate of 20% to 24%. Large corporations should not be allowed to transfer the burden of their taxes to their consumers, the senator stated.

"Tax policy can play a critical role in promoting increased competition and relieving some of the problems of the small and medium-size businesses if we are willing to simplify and modernize that tax structure and address some of these problems that have contributed to the concentration" of power, Hart said.

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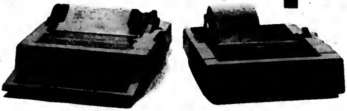

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# Change in Market Strategy Reincarnates EFT Company

**Robert L. Glass**
Special to Computerworld

SEATTLE — How do you take a business failure and convert it into a headline-making success?

Rethink your marketing strategies. At least, that was the answer for Howard Phillips, president of an electronic funds transfer (EFT) company called Telephone Computing Services (TCS).

TCS was first formed here about four years ago as a technology-centered company marketing computer-supported services via a Touch-Tone telephone system called In-Touch.

But within a year and a half, In-Touch had lost touch with economic viability — not enough customers signed up — and it went off the air.

Phillips believes In-Touch's problems hinged on marketing emphasis. "We made every mistake in the book," he recalled.

The services offerred were too diverse, too unexciting. Attracting customers — the service was sold to individuals — taxed the resources of his company, he said.

Buying out the interests of the Seattle bank which had helped fund the In-Touch failure, Phillips set about to correct those problem areas.

### Pay-By-Phone

The result is Pay-By-Phone, the apparent nationwide leader in the fledgling EFT system business [CW, Oct. 11].

With Pay-By-Phone, bank customers can pay their bills with a telephone call; payment is accomplished in many cases with no human interaction and without check paper being cut.

Of 25 such systems in nationwide use, 13 have been installed by TCS. Another 60 banks are under TCS contract.

### In-Touch Too "Techy"

The early system was too "techy," Phillips said. Its designers, including ex-Boeing engineer Phillips himself, were too excited by their computer technology to understand the customer base.

People don't want technology for its own sake, Phillips sees now. In this era of fast-food franchises and all-night grocery stores, people buy convenience, and Pay-By-Phone is marketed as a customer convenience, he said.

In-Touch offered a package of computer-related services: a Touch-Tone telephone calculator (before the days of the $15 hand-held model), a personal calendar, income tax data collection and preparation, family budget support, household recordkeeping and (almost as an afterthought) checkless bill payment.

Pay-By-Phone, by contrast, offers only the latter service and is marketed to banks rather than individuals.

Although TCS' first venture was partially supported by a local bank, the banking aspects were deemphasized and it was advertised as a computer-age phenomenon.

### No DP Emphasis

Pay-By-Phone ads don't even mention the computer; customer banks simply advertise it as another banking service.

With its new approach, TCS not only markets its product directly to banks, but in fact it is partially owned by a consortium of savings banks nationwide.

Motivating the formation of that consortium was Phillips' first task after In-Touch failed. Phillips traveled across the country, using the results of a favorable independent marketing survey to convince savings banks that Pay-By-Phone was a worthwhile new service.

The banking facts of life worked in his favor, Phillips said: Savings banks are willing to innovate if it means increasing their competitive posture with respect to "regular" banks; and with legal problems sometimes afflicting innovative branch banking approaches, a system in which each customer telephone in effect becomes a branch bank becomes very attractive, he noted.

### Slow Profitability

Profitability for TCS, despite its successes, is still emerging slowly, according to Phillips. "Immense" debts from the In-Touch failure have held back fiscal progress, he said.

But with over half the phone payment systems now in use nationwide having been installed by TCS; the future of this EFT attempt looks quite bright, he said.

Many of the company's contracts specify a one-half cent per transaction royalty payable to TCS, in addition to other charges. With total transactions nationwide running 220,000 a month and growing, TCS' wagon may well be hitched to a rapidly rising star.

## Bobeck Given Award

MURRAY HILL, N.J. — Andrew Bobeck, a Bell Laboratories electrical engineer who specializes in the development of magnetic logic and memory devices for computers and electronic equipment, was awarded the 1976 Valdemar Poulsen Gold Medal by the Danish Academy of Technical Sciences.

Bobeck was cited for his "outstanding research in the field of magnetic memories, particularly for [his] work in connection with magnetic bubble memories."

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## DP Humanization Campaign

# CM Backs 'George' as Small Business Systems Candidate

LEBANON, Ohio — Cincinnati Milacron's (CM) Electronic Systems Division (ESD) recently announced extensive marketing and distribution plans for a full line of small business system computers manufactured at its facility here.

Called the "George" series of minicomputers, the development of small business systems is completely consistent with some rather dramatic changes at the 90-year-old company.

James Geier, president, acknowledged at a special distributor preview of the George Model 40 minicomputer late last year that "we're really a changed company.

"For the last three years, we've been able to say that a third of our total sales has been in products that didn't exist three years before."

Continued development of computers for the firm's own use and for outright sale is essential for CM to remain a "first-class company," Geier added.

Wayne E. Sennett, director of marketing for ESD, explained the evolution of today's Georges.

"We got into the computer industry years ago due to its application to our numerical control systems for [CM's] machine tools. Increasingly, numerical control was being handled by computers," he said.

Additionally, CM is aware the small business systems marketplace is growing at a rate of 25% to 40% per year, Sennett said, indicating the manufacture and marketing of small business systems is more than a supplement to CM's machine tool controls.

### Marketing Strategy

Marketing strategy for the George series includes a direct appeal to first-time users. CM expects "beach head" sales of its models 40, 60, 70 and 80 to establish a growth pattern and repeat sales, Sennett said.

Prices of the small business systems range from about $16,000 to $70,000.

Humanizing George with literature and advertisements has also reduced the primal urge of many first-time users to fear that a computer might take over their business, Sennett pointed out.

George is an "employee," not the master in the everyday work relationship, he noted.

The first advertisement's headline in the *Wall Street Journal* — "Introducing George. Your First Computer." — set the tone for this year's campaign, Sennett continued. This was complemented by announcement of the program to the computer trade press.

Results have been impressive, he indicated. In the first weeks of the campaign, CM broadened its distributor base by more than 500% and handled more than 4,000 inquiries for further information from a toll-free "800" telephone number, according to CM's marketing department.

A dependable distributor base is significant to CM since it's most conscious of the need for successful end-user applications, Sennett said.

Furthermore, a CM distributor has the ability to tailor software to specific customer applications. CM has already developed "canned" application software for small business systems which will be supplied to distributors (accounts payable, accounts receivable, general ledger and payroll). They, in turn, will do the final tailoring.

In addition to the canned software for small business systems, CM has already developed, and extensively documented, what it feels is one of the best operating systems in the industry.

The higher level language used for programming the application software is RPG. RPG language is applicable to all four George models and is the most widely used in the small business system field, Sennett stated.

### Leasing Package

CM is now offering a leasing arrangement to end users through its distributors, which the company feels is convenient, competitive and supportive.

The CM distributor can provide a leasing package to an end user in much the same manner as automobile manufacturers provide leasing and financing through their dealers, Sennett explained.

The result is a convenience without penalty that is rather unique in the marketing of small business systems because so few computer manufacturers market through a distributor base.

Distributors are expected to benefit by the new leasing arrangement because it broadens the service to the end user. Some advantages in cash flow are also expected, Sennett said.

### Insight Into Trends, Attitudes

Regarding trends and attitudes of the end user, research into the user of small business systems has provided some remarkable insight, Sennett noted.

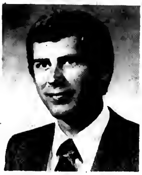
"The most significant thing is that end users have become more educated and more sophisticated, but not in the sense you might think. You'd think that a sophisticated end user would buy a lot of pieces, plug them together and be off and running. Actually that's what happened in the early '70s.

"Today it's just the opposite," Sennett pointed out. "Most end users are now looking for a turnkey installation.

"A company wants a solution to its problem without worrying about the nuts and bolts. It's not because [it's] not capable of plugging together a system. It's just lost its glamour.

"People don't stand around looking at it like they did a few years ago when the first instant copy machine was delivered. Now, they want it in operation and working," Sennett said.

"Specifically, end users are now benefit-oriented. They want to know what it will do, not how it works."



Wayne E. Sennett

As a manufacturer, CM, along with others, is selling a total package. "The package is evaluated on its total capability rather than a buyer being enamored by some special feature like capability of a printer when the total system cannot deliver that information to the printer," Sennett explained.

Buying unused capability in a component makes about as much sense as buying an electric typewriter for someone who uses the two-finger method," he noted.

Sennett also observed other trends that CM is watching: decentralized computer operation based on the need for localized usage and control, deemphasis of batch processing, the need to get the working machine down to the fellow who needs it day-to-day.

One of the most interesting things about CM is its low profile in the computer industry, according to Sennett.

In industry wrap-ups of major computer manufacturers, CM is usually not included or is an "also ran." Yet, CM has been a major supplier, he said.

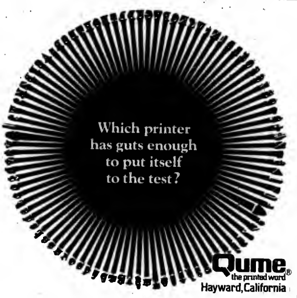
The reason CM is not more widely known is that until 1974 CM was strictly an OEM box supplier. Often the end user never knew it was a CM computer, Sennett continued.

As an example, he cited a major chain department store which has 160 CM computers in its point-of-sale system.

"The system is a great example of distributive processing, real-time processing and telecommunications, all in a beautiful configuration with dual computers, dual redundant control, switchable disk drive controllers, etc.

"Yet externally, the units are not identified as CM," he stated.

Overall, CM appears committed to a substantial share of the market for small business systems based on the George series of minicomputers. Additional evidence of that fact came on March 2, when it was announced that the division had formally changed its name from the Process Controls Division to Cincinnati Milacron, Electronic Systems Division.



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# Ampex Aiming Its Megastore at 'Access Gap' Mart

EL SEGUNDO, Calif. — Ampex Corp. is aiming its newly announced Megastore memory at the minicomputer market currently served by fixed-head disks and, additionally, at the "access gap" marketplace.

Specifically, the Megastore is targeted at the market for fixed-head disks used on Digital Equipment Corp. PDP-11s and Data General Corp. Novas.

In analyzing this potential market for Megastore, Ampex assumed increased throughput and reliability would be the prime factor affecting the decision to use the fixed-head alternative, according to Al Sroka, OEM marketing manager.

In addition, a survey of the purchasing plans of OEM systems manufacturers using the targeted minis was analyzed to determine the quantity requiring fixed-head disks.

Of the 3,830 computers these companies intend to purchase over the next year, nearly 1,500 appear destined for applications sensitive to reliability and each would be equipped with an average of 2M bytes of fixed-head disk, Sroka noted.

Using an average price for a 2M-byte Megastore and a 15% growth per year, Ampex estimates its potential total market at $43.8 million in 1977, $43.7 million in 1978 and $44.4 million in 1979, he said.

"Assuming that the reliability and throughput advantages of Megastore are sufficient to overcome the increased initial costs in these application areas, as discussions with potential customers have indicated, it is Ampex's plan to capture an early minimum of 25% of the available market, Sroka said.

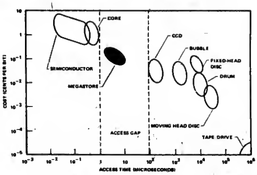
## Access Gap

While a variety of devices employing magnetic tape, disks and drums have been developed to provide peripheral storage of data, a considerable gap exists between data access time for main memory and that for peripheral devices, he pointed out.

Over the years, he said, the access and cycle times of main memory have improved until today these times are typically in the 300- and 600-nsec ranges respectively.

The access times for peripheral storage have also improved, but typically remain in the 10-msec range even for the fastest devices, he noted.

Still, several orders of magnitude difference exists in access time, he noted (see accompanying chart).



Ampex Corp. Chart

Memory Aceess Comparison

Though many systems employ fixed-head disks and/or drums to reduce this gap to the barest minimum, the gap still remains significant, Sroka said.

In addition to electronic failures, these rotating devices with their flying heads are subject to mechanical failures such as head crashes, bearing wear, etc., which reduce their life, he stated. They require scheduled preventative maintenance which is getting more and more expensive.

When a mechanical failure or accident occurs, they can be refurbished or rebuilt; however, that cost often equals 50% of the original purchase price, he added.

## Time Is Money

The system throughput as effected by the access gap and maintenance cost impinge on the economics of a user's operation. Time is definitely money. The time needed to perform the required volume of operations could necessitate additional systems, added personnel and space, he said.

"Industry planners have been speculating for years about the possibility of mass storage having an access in the low microsecond range that was inexpensive enough to use in quantity, Sroka continued.

"Ideally such memory would be all electronic which would both minimize maintenance cost and reduce the time to repair. Such a memory would increase the initial cost somewhat, but would greatly reduce the user's costs over the expected product life," he stated.

The new class of peripherals from Ampex, notably the Megastore, is designed to fill the access gap with a minimal premium in initial cost, Sroka explained.

"Megastore is an all electronic device. Modular in construction, it facilitates fast back on-line repair should a failure occur.

"The increased system availability, increased system uptime, enhanced system throughput and negligible maintenance costs will actually result in a lower cost to the user over the lifetime of the system," he indicated.

# Executive Corner

- Dr. Frank L. Allen has been elected chairman of the board of ADL Systems, Inc., a subsidiary of Arthur D. Little.
- Ryal R. Poppa has been elected chairman of the board of Pertec Computer Corp., succeeding Donald F. Eldridge who is retiring.
- Jerome W. Hull, chairman of the board of the Pacific Telephone & Telegraph Co., has been elected to the Ampex Corp. board of directors.
- James P. McFarland, who retired from chairman of General Mills on Feb. 1, has joined the board of directors of Data Card Corp.
- T. Jack McElreath has joined Computer Partners as a senior partner.
- Bernard L. Friedman has been elected president and chief operating officer of Analogic Corp.
- Andrew F. Inglis has been elected president of RCA American Communication, Inc.
- Philip J. Bifulk has been named president of Technotec, a technology exchange service company of Control Data Corp.
- Roy P. Thiels has been named director of MOS/LSI operations for National Semiconductor Corp.
- Daniel E. Lott has been named to the newly created position of director of product marketing for MSI Data Corp.
- Bruce A. Marlow has been named president and chief executive officer of Novo Communications, Inc.
- Paul Busse has been appointed corporate treasurer of Pertec Computer Corp.
- Thomas L. Ringer has joined the executive staff of the Logical Machine Corp. as part-time executive consultant.
- Donald V. Fluken has been appointed treasurer of Measurex Corp.
- Robert Budenstein, formerly the director of marketing for Paradyne's Corp.'s retail sales operation, has joined the international and OEM sales department.
- Christopher J. Lynch has been elected senior vice-president of Incoterm Corp.
- Christopher Keith was named senior vice-president for systems planning and development and Charles B. McQuade was named senior vice-president for member and exchange services of Securities Industry Automation Corp.
- Ralph Neely has joined the staff of Optimum Systems, Inc. as assistant to the marketing vice-president.
- Frederick B. Schudel has been named vice-president for manufacturing operations of Lexitron Corp.
- Glenn H. Sacra has been named president of GTE International Systems Corp.
- John R. Johnson has been elected as senior vice-president of Lear Siegler, Inc. and Robert C. Sherburne has been elected as corporate vice-president.
- Gary S. Beebower has been elected vice-president of marketing at Diva, Inc.
- William K. Brehm, former assistant secretary of defense, has joined Computer Network Corp. as executive vice-president.
- Don Mueller and Steve Frankel have been appointed assistant vice-presidents of planning and development for Computer Transmission Corp.

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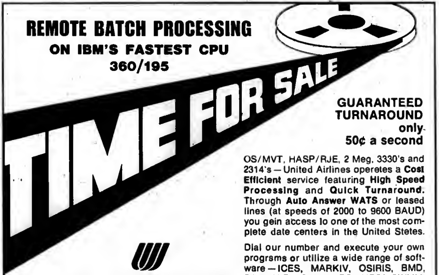

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# Bentsen Urges Incentive System To Achieve Economic Objectives

(Continued from Page 53)

the stock exchange was attributable to the individual investor. Today, less than 20% of this volume is from the investor who buys a new stock issue, he noted.

Congress has tried to help the individual investor "a little — not nearly enough — by raising the capital loss provision from $1,000 to $3,000 to charge against ordinary income, to try to moderate the gamble that anyone has going into the stock market," Bentsen said.

Another congressional effort to redirect capital from the large corporation to the small and medium-sized company has backfired somewhat, however, he added.

In hopes of freeing some of the money contained in pension funds, Congress took the pension law and added a risk provision that advises against putting more than 5% of a fund's holdings into any one stock — the "prudent man rule." The result has been the reverse of what the legislators intended, Bentsen said.

Pension fund investors are afraid to go into venture enterprises under the "prudent man rule"; instead, they put their money with the biggest banks so they can't be criticized. They invest in the Morgans, the Chases and the Chemicals, he stated.

"If you were a portfolio of $27 billion, where would you invest?" Bentsen asked."You wouldn't go with the small or medium-sized company. You'd invest in the IBMs, the Polaroids, the General Motors.

"Why? Because you'd have to have lots of float in that stock; you'd have to be able to get in and out," he said. In addition, it's much easier to look after a few companies through a stock analyst than to watch 400 or 500 companies.

Bentsen has introduced legislation which would prevent the investment of pension funds in more than 5% of the stock of a company — unless it's a company that has a capitalization of $25 million to $100 million or less.

The intent of this legislation is twofold: to protect the pensioner against "bad news" from one of these big companies and the resulting precipitous drops in its stocks and to get more investment money to banks across the country, Bentsen explained.

The senator suggested the country needs a graduated capital gains tax that will depend on the length of time a company or any asset is held. A graduated tax doesn't permit a "quick gain," but is instead a minimal tax related to time.

Bentsen said he will work this year to make capital more mobile by trying to get pension funds to diversify their investments into medium-sized companies.

## Small Manufacturers' Mart Seen More Than $2 Billion

PALO ALTO, Calif. — Small manufacturers represent a $2.6 billion annual market for DP equipment and a $130 million annual market for DP services in the automation of applications related to production control, according to a report by Small Business Systems, publishers of *Small Business Systems Industry Report.*

The reason few manufacturers actually automate material requirement planning (MRP) is that they are unable to collect accurate inventory and shop-flow data, prepare a realistic master production control schedule and produce clean bills of materials, the report stated.

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**Who is Miles Benson, and why is he writing about things that went wrong?**

Not many people aspire to become experts on failure, but the man behind the pseudonym "Miles Benson" has made a career-long hobby of things that go wrong in the computer business. Collecting information from contacts around the country, "Miles" retires to the back seat of his Studebaker where, for several years, he has turned out columns on catastrophes (and less spectacular failures) for *Computerworld.* Now he has compiled the best of the worst into a single book:

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### Investors Answer SOS

# DMS Sets Sinking Ship Afloat

BEDFORD, Mass. — Last September, Codon Corp. slipped silently beneath the waves; but its product, at least, has resurfaced, buoyed by a new firm — Distribution Management Systems, Inc. (DMS).

Codon, formed in 1967, had built a solid product — a computerized distribution management system. Called the Codon CB-100, the system had a small but enthusiastic list of blue-chip customers.

The company, however, was unable to meet its loan payments and no further financing was available.

Just as the corporate scheme was about to go under for the third time, rescue appeared in the shape of an investment group headed by Cornelius Peterson, former president of Softech, Inc.

After a thorough investigation, his group decided that Codon represented the opportunity it was looking for, Peterson said. The product and customer bases were solid, the market largely untapped.

Key technical and marketing personnel were in place and enthusiastic about moving ahead under new leadership.

### No Time Wasted

The investment group didn't waste any time. As of Oct. 1, Peterson was installed as president and chairman; rights to the Codon line were acquired; plans and programs were initiated, even though a new name for the company had not yet been cleared.

Last month, the new name was finally cleared, and DMS was baptized.

Since he took over, Peterson has moved swiftly, adding experienced financial and technical management people, installing sound reporting, control, accounting and contracting procedures and setting reasonable, reachable goals. The system was enhanced and dubbed the DMS-1000.

Peterson also narrowed the company's marketing targets.

DMS is now zeroing in on consumer product producers and distributors, to whom distribution is a critical function, and requiring a network linking multiple distribution points, Peterson stated.

The DMS-1000 is currently serving several networks of distributed processing points (warehouses, distribution centers, regional sales offices or major plants).

Initial emphasis will be on the distribution of food products and automotive supplies. This is primarily because the DMS-1000 is cutting costs and improving customer service at various companies including T.J. Lipton Co., Mobil Oil International, Reed Candy Co., A.B. Dick, Champion Products and GTE Automatic Electric.

Peterson has also hit the trail, leading the firm's marketing effort.

"There's a lot of business out there for a proven product such as the DMS-1000," he said, noting that in December, DMS turned out detailed proposals for over $2 million worth of DMS-1000 systems.

Nevertheless, Peterson feels the old turnkey business is dead. "The days of outside companies such as ours taking total responsibility for a customer's distribution system is long gone," he said.

"The day of the full service company is here. That means that a company such as [DMS] has to be closely involved in a joint relationship with the customer in system specifications and design, modification of the application programs to meet particular needs, customer training, final acceptance tests and maintenance.

"The customer can provide all the support services and just buy the basic hardware/software or select unbundled services from DMS," he said.

"Even when 95% of the applications program code can be used in typical cases — as is true of the DMS-1000 — a great deal of attention must be paid to system installation and training and to tuning the system to meet the particular report requirements of individual customers," he continued.

"Our competitive edge is in providing a better system quicker for lower life cycle costs than either doing it in-house or buying from a competitor.

"Our DMS-1000 software system is built on a base of over 40 successful installations," he stated.

## ADP, Conticurrency Ink Pact

ANN ARBOR, Mich. — ADP Network Services, Inc. and Conticurrency have approved an agreement under which Conticurrency's foreign exchange and money market information service will be made available to clients through ADP Network Services' international remote computing network.

Additionally, ADP Network Services will have the right to use Conticurrency's extensive foreign currency data base.

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Utility Packages

A special report in the April 25th *Computerworld*.

Whether you're sorting, spooling, writing, reporting, managing, maintaining, securing, capturing, manipulating or preparing data — you've probably used (or thought about using) one of the multitude of utility packages currently available.

*Computerworld's* April 25th special report, edited by Don Leavitt, will take a close look at the selection and use of these packages — with tutorials, user experiences and commentary on topics like these:

Computer operations and scheduling support systems — help operators make efficient use of hardware and software resources
Replacements, enhancements and extensions for utilities supplied by hardware vendors — operator invoked systems such as sorts, merges, file transfer and initialization
Data capture systems and support tools — for the capture, preparation and temporary storage of data
Data management systems and support tools — for the organization, storage, security, management and maintenance of permanent data files
Data retrieval, computation and presentation systems — for the retrieval, manipulation and output of data

If you're involved with programming efficiency — as a DP manager, programmer or analyst — you'll find useful information in this report. And if you're a software vendor or consultant you should advertise your products and services here. Ad closing date is April 8. Contact your *Computerworld* salesman for complete details. Or call Judy Milford at (617) 965-5800 to reserve space for your ad.

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## Soviet Confab Set

MOSCOW — Control Data Corp. and the USSR Ministry of Health have arranged a joint seminar of Soviet and U.S. medical leaders to exchange information on health care systems and discuss the use of computers in medicine.

The seminar will be held March 9-11 at the N.A. Semashko Institute on Social Hygiene in Public Health Organization here.

Speakers will include medical experts from eight U.S. health organizations and CDC and 12 Soviet medical leaders.

Seminar topics will include presentations on health care delivery systems in the two countries, present and future needs for medical technology and the use of computers in clinical laboratory operations, intensive care units, multiphasic screening of mass populations and other areas of medicine.

# Wipo to Consider Model Software Protection Law

Special to Computerworld

GENEVA, Switzerland — An advisory group to the World Intellectual Property Organization (Wipo) will meet June 1-3 to consider a draft text of a model law on the protection of computer software.

The revised draft, prepared by Wipo's International Bureau, is the product of more than three years' consideration by the organization. Its purpose is to present a complete set of regulations to protect software even though they may not correspond to the requirements of the legal system of each country interested in adopting the provisions.

### Complete Plan

By proposing a complete regulation plan, the authors believe attention can be drawn to various problems which may exist under particular national systems and possible solutions may be found.

The model legislation, which contains eight sections, defines the protected subject matter including the terms "computer program," "program description," "supporting material" and "computer software" and the terms "proprietor" and "unauthorized person."

It also deals with the question of to whom the rights to software belong — in particular if it has been created by an employee — and regulates the transfer of those rights.

## International News

It also defines the requirement of originality of computer software.

### Unlawful Acts Listed

The model law establishes a list of unlawful acts such as unauthorized access or disclosure and those relating to unauthorized copying, use and sale, for example, of computer software.

Further, the draft defines the terms of protection and establishes limitations to protection in regard to independent creations, the use of programming concepts and the particular situation of foreign vessels, aircraft, spacecraft or land vehicles entering the waters, airspace or land of a country.

Finally, it establishes the relief available for unlawful acts and makes clear that protection on the basis of other provisions is not excluded.

### Clarification Intended

Wipo noted this model national law does not mean all countries must adopt new or separate laws on software protection. Instead, the principles it contains could clarify or extend existing legal rules. This might be the case for amending copyright laws, trade secret or unfair competition statutes.

The Advisory Group of Nongovernmental Experts on the Protection of Computer Programs will consider the model law and report on its merits. According to the bureau, the "establishment of an effective protection of computer software in as many countries as possible is desirable, not only from the point of view of each country but also from the point of view of the International community.

### More Than One Country

"The use of computer software frequently concerns more than one country . . . and if effective protection of computer software existed in only one of the countries involved, it might happen that no protection whatsoever is granted, since in the country with the effective protection it may not be possible to prove the unauthorized act was committed on its territory and not in the other country.

"To fill those gaps and to achieve international harmonization of national laws is one of the purposes of the model provisions for the protection of computer software."

## USIA Plans Displays Of Remote Computing

WASHINGTON, D.C. — The U.S. Information Agency (USIA) is sponsoring a series of data search and retrieval demonstrations for top-level decision makers in 10 countries in the Near East, Latin America and Southeast Asia.

The demonstrations, to be known collectively as "Project Info/Speed," will use data bases in the U.S. via commercial telephone lines. They are aimed at showing leaders in developing countries how they can gain instantaneous access to American data bases at relatively modest cost, according to the USIA.

### Series Schedule

Project Info/Speed is scheduled for March 17 in Lagos, Nigeria and March 23 in Nairobi, Kenya.

Similar presentations are scheduled in Southeast Asia beginning with Jakarta, Indonesia, May 25.

Further information is available from Walter Froehlich, program officer, science and technology, ICS/DS, U.S. Information Agency, Washington, D.C. 20547.

## Infonet Center in Madrid

MADRID, Spain — Entel-Ibermatica, a subsidiary of the National Telephone Co. of Spain, has opened a computer center here to provide Infonet remote computing services throughout Spain under a previously announced license agreement with Computer Sciences Corp. (CSC) of El Segundo, Calif.

The center uses a Univac 1108 mainframe and CSC-supplied software.

CSC also provides Infonet service in France, England, Belgium, West Germany and The Netherlands from its U.S. facilities via satellite.

Affiliated companies operate Infonet services in Canada, South Africa and Australia.

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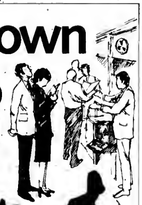

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**Cleveland** Convention Center—April 19–21
**Minneapolis/St. Paul,** St. Paul Civic Center —April 26–28
**Chicago,** McCormick Place—May 3–5
**New York** Coliseum—May 10–12
**Philadelphia** Civic Center—May 24–26
**Washington, DC,** Sheraton Park Hotel —May 31– June 2
**Boston,** Northeast Trade Center (Rte 128, exit 39) —June 7–9

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**ENROLL:** Case *Study User Forums** will be conducted in all nine cities by leading users and independent consultants. Topics are: Applying Minicomputers (Tuesday) • Managing Terminal Networks (Wednesday) • Improving Software Productivity (Thursday)

**NOTE:** *Computer Designer Forums** will also be available in San Francisco, Los Angeles, Chicago, New York and Boston. Topics include: Evaluating and Using Microprocessors • Evaluating Peripherals for Mini- and Microcomputers • Evaluating Memory and Storage Devices

*The Forums are held in conjunction with COMPUTER EXPO and require separate registration and fees. They are held each day from 9 AM to 1 PM. One day's admission fee is only $45, additional days are $35. Advance registration is recommended. Call (800) 225-3080 to reserve your space and get complete registration materials.

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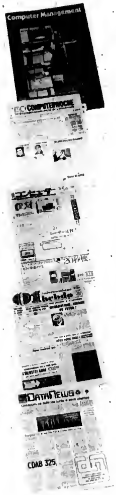

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# Acquisitions

**Harris Corp.** has completed the acquisition of Sanders Associates, Inc.'s **Data Systems Division** for about $15 million in cash and the assumption of $2 million in current liabilities.

**Motorola, Inc.** has agreed in principle to acquire **Codex Corp.**, a supplier of data communications equipment, for stock valued at about $85.6 million,

**Data Devices International, Inc.**, manufacturer of magnetic media maintenance products, has acquired for cash the winder/cleaner/certifier product line of the **Mincom Division** of 3M Co.

**Quantor Corp.** has agreed in principle to acquire all the operating assets of **General Micrographics Corp.** and its Micrographix System Division. The agreement calls for the exchange of 160,000 shares of Quantor common stock for the operating assets of General Micrographics.

**PPC Products Corp.** has acquired **Semiconductor, Inc.** The agreement allows PPC to supply a broader line of semiconductor devices.

**Memorex Corp.** has agreed to acquire **Lencor International**, a computer media manufacturer, for $2.4 million in cash and 200,000 shares of Memorex common.

**Automatic Data Processing, Inc.** (ADP) has acquired the Tulsa, Okla., and Denver, Colo. **DP centers of Affiliated Computer Systems, Inc.** for $1 million in cash. ADP also acquired **The CPI Group, Inc.** for 240,015 shares of ADP common stock.

**Electronic Tabulating Corp.** has acquired the assets of **P.C. & Associates**, a company which provides software and specialty consulting services to insurance companies.

**Landis & Gyr North American Group** has acquired **Sheldon Printer Corp.**

**The Foxboro Co.** has acquired **I.C. Transducers, Inc.** Under terms of the agreement, Foxboro paid ICT 19,666 shares of Foxboro common stock.

**Technitrol, Inc.** has acquired the assets of **G&G-Tresco Corp.** to provide magnetics capability,

**Telex Computer Products, Inc.** has acquired United Technologies Corp.'s subsidiary, **Terminal Communications.** Terms of the cash sale were not disclosed.

**Control Data Corp.** has acquired **Great Western Loan & Trust Co.** of San Antonio, Texas, for an undisclosed amount of cash.

**Northwest Microfilm, Inc.** has acquired **K.C. Micro Systems, Inc.**

**Microdata Corp.** has acquired **Applied Computing Technology, Inc.** for approximately $400,000 in cash.

**Techtran Industries, Inc.** has agreed to acquire **A.D. Data Systems, Inc.**

**Dymo Graphic Systems, Inc.**, manufacturer and developer of phototypesetting systems and equipment, has acquired **Xylogic Systems, Inc.**

**International Timesharing Corp.**, a subsidiary of United Telecommunications Inc., has acquired **Standard Computer Corp.** Under terms of the agreement, International Timesharing exchanged 231,596 shares of United Telecom common stock for the business, assets and assumption of certain liabilities of Standard Computer.

**Logic, Inc.** has agreed to acquire the computer services business of National Chemsearch's DP subsidiary, **Systems General Corp.** Terms were not announced.

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To qualify you would have 3-5 years experience designing and programming manufacturing systems that include bills of material, material requirements planning, inventory control, standard routing, etc. Experience utilizing on-line transaction processing software, data base management systems and COBOL programming is a requirement. A definite plus would be experience with large scale development projects requiring formal project planning and professional systems documentation.

Ideal candidates would possess a degree in business administration with an MBA being preferable.

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We offer opportunities to participate in the design and development of on-line transaction processing software. You would also be involved with software interfaces to data base management systems. Main emphasis would be placed on gaining knowledge of internal systems design characteristics in preparation for introduction to the customer market. Candidates would be working with a software development team engaged in transaction processing sofwtare development for the NCR Century and Criterion processors.

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This dynamic, growing organization located at our Corporate Headquarters in Maynard, Massachusetts, needs some good people to help organize or operate management systems for our worldwide Software Services Organization.

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## SYSTEMS ANALYST

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L.A. Physics major, micro/minis, 2 to 5 yrs. exp. $18 to $25K.

INDIANA-Corp Mgr-shirt sleeve mgr, COBOL or NEAT 3, strong mgmt backgrnd, mfg environ $30K

L.I., N.Y.-DP Mgr, No. 2 man, 28K, 5 yrs solid mgmt exp. Large IBM hdwre-COBOL-RPG.

N.Y.S.-Sys An, proj ldr, 21K. Feasibility studies, cost justification, mfg.

ALL AREAS-Progs, Progs-Analysts-Hdwre & minis. $15 to 21K.

Francis Rogers Assoc.
25 So. Service Rd.
Melville, N.Y. 11753
516-997-4373 212-347-6313

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# DIRECTOR OF COMPUTER SERVICES

Indiana University Northwest is accepting applications for the position of Director of Computer Services. The position is now open. The Director is the principal administrator and responsible for supervision of all personnel, coordination of local administrative data requirements with network resources, and consultation with faculty and administrative staff.

Minimal qualifications include three years' managerial experience with computer operations, B.S. degree (M.S. or Ph.D. in Computer Sciences or related field preferred).

Applications must be received by March 25, 1977. Send resume and three letters of reference to Chairman, Computer Services Search and Screen Committee, c/o Dean of Faculties Office, Indiana University Northwest, 3400 Broadway, Gary, Indiana 46408.

*An Equal Opportunity*
*Affirmative Action Employer*

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## CICS

Several Washington, D.C. area firms are in need of experienced CICS Programmers and Analysts in both OS and DOS environments. Ability in either COBOL or ALC is required. Knowledge of a DBMS would be a plus. These are growth positions offering good advancement opportunities. Salaries range from 13 to 20K. For info on these and other positions, call (301) 652-1182 or send resume in confidence to

DON RICHARD ASSOC.
7315 Wisconsin Ave.
Ste. 726E
Bethesda, Maryland 20014

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## O. S.

## SYSTEMS ANALYSTS

2-5 years operating system experience, preferably on CDC 6000 or CYBER systems. Degree in computer Science or Computer Science.

*Send resume & salary requirements to:*

SDC
Integrated Services, Inc.
3217 N. Armistead Ave.
Hampton, VA 23666
*Equal Opportunity Employer*
*M/F/H*

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# COMPUTER SYSTEMS

As one of the midwest's leading multi-divisional management and systems consulting organizations, our steady growth requires top professionals in the following areas:

- Systems Programmers - Specialized in IBM 370/OS and Honeywell 6000.
- Business and Scientific Applications Analysts/Programmers - Experienced in Honeywell 6000 GECOS, IBM 370 series, Burroughs and Xerox systems.
- Real-Time Communication and Process Control Programmers — Experienced in IBM S/7, HP 2100, and Varian 600.

Top salaries, moving allowance and fully-paid fringes including life, health and dental insurance, and educational benefits. Call or send your resume to:

**M.I.S. INTERNATIONAL, INC.**
31350 Smith Rd.
Romulus, MI 48174
(313) 326-7010
*Equal Opportunity Employer*

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# MANAGER OF PROFESSIONAL STAFF DEVELOPMENT

## *A Career Opportunity*

American Management Systems, Inc. (AMS) is a nationwide firm specializing in the design and implementation of computer systems for business applications. In seven years, we've grown to a $12 million (1976 sales) company, and sales in 1977 should exceed $16 million. Our professional staff will expand to over 200 this year.

We are looking for an experienced person to organize and manage a corporate-wide training program for the professional staff which includes people with degrees in computer science, applied mathematics, and business administration. Specific responsibilities include:

- **development and presentation of internal courses;**
- **acquisition of training materials and organization of procedures for making them available to our staff at headquarters and regional locations.**
- **establishment of a skills inventory system to support training, recruiting, and project staffing functions;**
- **identification of worthwhile outside courses to be attended by selected personnel; and**
- **management of the $300,000 budget for this program.**

The Manager of Professional Staff Development will be located at our headquarters in Arlington, Virginia and will report to our Executive Vice President for Personnel. Salary will be in the $25-30,000 range depending on skills, experience and past performance. AMS also provides substantial fringe benefits and will pay relocation costs.

Qualifications should include.

- **experience in the design, development and implementation of data processing systems for business applications;**
- **knowledge of IBM hardware (360/370) and software (OS/VS; IMS; CICS);**
- **knowledge of higher level programming languages (COBOL, PL-1, FORTRAN);**
- **familiarity with training materials which may be purchased or leased; and**
- **experience in developing and presenting courses for programmer/analysts and systems analysts.**

Because of our ambitious plans for 1977, we would like this person to come on board by April 15 – sooner if possible. However, 1977 is just a beginning. Our five-year plan is to grow at a rate of 30-35% per year by increasing our current business and by getting into new markets for computer services; building the human resources necessary to support our business is the purpose of this position. It is a career opportunity.

For immediate consideration, please send your resume, description of training accomplishments, and salary history to:

**Frank A. Nicolai**
**Executive Vice President**
**1515 Wilson Boulevard**
**Arlington, Virginia 22209**

**AMERICAN MANAGEMENT SYSTEMS, INC.**

ams
AMERICAN MANAGEMENT SYSTEMS INC
*An Equal Opportunity Employer M/F*

## APPLICATION PROGRAMMER ANALYST II

Florida Power Corporation, an investor owned public utility serving the Gulf Coast, Central and Northern area of Florida, has an immediate opening for an Application Programmer Analyst II. Salary $16,000-$19,000. Responsible for interfacing with user departments to resolve teleprocessing requirements; assist in the development and maintenance of teleprocessing supervisory control programs. Will be working with IBM S/370-158 using OS/WVS2.

Qualified applicants must have a Bachelor's Degree and five (5) years programming experience. Must have extensive knowledge of assembler language and a working knowledge of COBOL and IBM job control language.

Send detailed resume including salary requirements to:

Michael S. Reeder
Florida Power Corporation
P.O. Box 14042
St. Petersburg, Fla. 33733
*Equal Opportunity Employer*

## TIME FOR A CHANGE?

Immediate openings for all levels of experience: Analysts, Programmers. Software Specialists, Project Leaders/Managers, IBM System/3 Managers, etc.

Cadillac's EDP placement service is without cost to you. Companies pay all fees and expenses. Client firms are located nationwide, and are engaged in all industries — Manufacturing, Banking, Insurance, etc.

We offer assistance in evaluating your present position. Just send your resume and we will call you to discuss your objectives and explain how we might help you reach your goals.

FREE — EDP OPPORTUNITIES BULLETIN, a representative list of our career opportunities, mailed free of charge upon request.

For more information on our "fee-paid" placement service, send your resume to:

Mark Futler
CADILLAC ASSOCIATES, INC.
32 W. Randolph St.
Chicago, IL 60601
(312) 346-9400

# Advanced Data Communication Systems

ITT Defense Communications Division, a leader in the field of DIGITAL DATA COMMUNICATION SYSTEMS is expanding its Systems Engineering capability and has career growth opportunities for candidates with degree in Engineering, Mathematics or Computer Science.

## DATA COMMUNICATION SYSTEM ENGINEERS

. . . with experience in the evaluation, analysis and design of basic data communications systems. Specific background required in: (a) Communications Services — Use of low/medium and broadband facilities. (b) Communications Applications — Engineering aspect of wide range of data codes, formats, error detection and correction facilities and COMSEC. (c) Networks — System engineering related to the control and performance of military distributed networks having numerous interfaces with other networks with varying line protocols and operating procedures. (d) Hardware and Software — Analysis and design of Telecommunication front-end applications. Must know interrupt requirements, scheduling buffer management and table schemes.

## COMPUTER SYSTEM ARCHITECTURE

. . . with experience in the design of systems and computer programs for packet switched networks with specific strengths in the following areas: System Architecture (trade-offs in system design), Computers (familiar with mini and micro computer architecture — programming experience in real time); Communications (familiar with commercial and military standards for communications, protocols, data codes and formats). Experience in the design of line handling hardware.

## PROGRAMMERS

. . . with heavy experience in real time message-switching and communication system design and implementation. Assembly language experience required.

Please send resume, including salary history, to Mr. J.J. McMahon, ITT Defense Communications Division, 492 River Road, Nutley, New Jersey 07110.

**DEFENSE COMMUNICATIONS ITT**

*An Equal Opportunity Employer, M/F*

## NEW HAMPSHIRE NEEDS COMPUTER PROGRAMMERS

Our Data Processing staff is preparing for a transition to the project team concept. Your experience and input at this exciting time offers challenge and involvement. If you are looking for a fulfilling programming position, this is it!

Consider an excellent benefits package, special training programs, the amenities of N.H. life, a progressive working enviromment and a competitive starting salary.

Qualifications include two years hands-on experience and knowledge of COBOL, BAL and/or Autocoder. Familiarity with an IBM 370/135 DOS/VS environment or knowledge of insurance applications would be a plus.

Send resume and salary history to:

United Life and
Accident Insurance Co.
Attn: Employment Manager
One Granite Place
Concord, N.H. 03301
*An Equal Opportunity Employer*

**THE ZIA COMPANY**
**Los Alamos, New Mexico 87544**

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## ELECTRICAL ENGINEER POWER PLANT

Position open for person with an engineering degree or equivalent, and experience with hardware and software equipment similar to TRW SCADA system using MODCOMP II Computer and Conventional controls for an electrical generating power plant.

Apply or send resume to:

Personnel Director
The Zia Company
Los Alamos, New Mexico 87544

*(An equal opportunity employer)*

Data Processing

## CAREER OPPORTUNITIES

We have unique opportunities for Data Processing Professionals. Locations in numerous cities throughout the United States.

### SYSTEMS ANALYST CONSULTANTS

Data Base Design — IMS — IDB — DC
On-Line Airline — Financial Pars
Manufacturing — Retail — Petro Chemical

### SYSTEMS SOFTWARE

IMS — TSO — ACP — OS — VS, MVS

### PROGRAMMERS

COBOL. PL/I, FORTRAN, ALC
PARS — ALL APPLICATIONS
Salaries to $30,000 Plus Bonus

Interested candidates send letter or resume in confidence to:

CW Box 4943
797 Washington St.
Newton, Mass. 02160
*An Equal Opportunity Employer M/F*

## CONNECTICUT WANTS COMPUTER PROFESSIONALS

Whether you are a Programmer with one year's experience or a Manager responsible for your company's total DP effort, Romac's Connecticut clients are making plans that could include you.

Experienced Programmers and Analysts are in growing demand, both in applications and systems software. Hardware/Software Planners, Systems Consultants, Operations Managers, Systems Analysts are being sought by our clients in increasing numbers.

Whatever your data processing experience, there is a good chance Romac can help you. We specialize in the screening and placement of qualified persons in data processing. (Accounting and Finance, too). Since all our Associates have had experience in one or more of these areas, we take pride in our ability to provide our candidates and clients with a highly effective degree of screening — helping you to find the right position. May we be of assistance to you?

*ROMAC & ASSOCIATES*

*380 Boston Post Rd.*
*Orange, CT 06477*

*2777 Summer St.*
*Stamford, CT 06905*

*342 North Main St.*
*West Hartford, CT 06117*

*All fees paid* *Highly Confidential*

## COMPUTER PROGRAMMER II

College degree plus three years experience in programming. Must know Cobol, Assembler or PL-1 languages. Excellent fringe benefits. $1045-1154 monthly, depending on experience. Mail resume to City of Amarillo, Personnel Department, P.O. Box 1971, Amarillo, TX 79186.

An Equal Opportunity Employer

## 21 SHOESTRING START-AT-HOME COMPUTER BUSINESSES

113 page research report uncovers areas never published, plus hundreds of how-to-do-it ideas on moonlighting, starting up, image building, bidding, contracts, failure signals, and much more. A superior career planning tool $12.00 (check, Mastercharge, Bankamericard) Guaranteed Refundable, to DATASEARCH INC., Suite 108, Dept. H, Deerfield, IL 60015.

## IMS PROFESSIONALS ONLY

If you are a programmer programmer/analyst, systems analyst, or EDP professional and would like the most individualized job search offered in the data processing field today on a local or national level, forward your resume, with present salary and geographical preference, in strict confidence, to:

E.D.P. SEARCH, Inc.

P.O. Box 331
Hartford, Conn. 06101

## PROGRAMMER/ANALYSTS

Growing midtown New York City International Bank seeks programmer/analysts with 2-5 years previous experience on PDP-11/45 or 11/70 basis language and RSTS BS degree required previous banking is desirable.

Salaries commensurate with experience as well as participation in our outstanding benefits program excellent growth potential.

Send resume complete with salary history in confidence to:

MS Masur
Republic National Bank of New York
452 Fifth Ave.
New York, NY 10018
*Equal Opportunity Employer M/F*

## SUPERVISOR

### Systems and Programming

A leading equipment manufacturer located in the beautiful Southeastern U.S. has an immediate opening for a Supervisor, Systems and Programming. We utilize a 370 DOS/VS, TP, and DATA BASE. Languages used are Assembler and ANS Cobol. Preference will be given to applicants who have a background in manufacturing applications. Salary will be commensurate with experience with a complete benefits package.

Send resume and salary requirements to:

CW Box 4914
797 Washington St.
Newton, Mass. 02160
*An Equal Opportunity Employer*

## ACCOUNTING SYSTEMS MANAGER

One of the nation's leading Forestry and Wood Products corporations, headquartered in the Seattle area, is seeking an experienced Accounting Systems Manager to function as an Internal Consultant for Financial Systems.

Requirements call for familiarity with financial systems of two or more multi-plant and multi-state corporations as well as practical systems design experience. Exposure to computer and automated systems, implemented support systems requiring user training, conversion, documentation and follow-up is also a necessity.

The self-starter we seek must be a problem solver possessing good communicative skills and the ability to present ideas to top management. Educational qualifications include a Bachelor's degree in Business, Finance or Accounting. CPA and post graduate education in DP preferred.

This career opportunity offers excellent salary, benefits, and bonus potential. Qualified candidates are invited to submit resume with salary history in confidence to:

CW Box 4941
797 Washington Street
Newton, Mass. 02160

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BOEING

# Software and Computing Systems Engineers

The Boeing Company in Seattle, Washington has immediate requirements for experienced software and computing systems engineers. Assignments will be in command and control, avionics and related product applications and require experience in: Software/Computing Systems Design Analysis; Real-Time Operational Software Development; Support Software Design and Development or Software/Computer System Quality Assurance.

Candidates must have an appropriate BS degree or higher and be U.S. citizens.

Attractive salary, fringe benefits and moving allowances will be offered qualified candidates. You will find living is a pleasure in the unspoiled Northwest with its many recreational and sports activities and relaxed life-styles.

Please send your detailed résumé to The Boeing Company, P.O. Box 3707-LBI, Seattle, WA 98124.

An equal opportunity employer.

**BOEING**
*Getting people together.*

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## PROGRAM COORDINATOR

This opportunity offers both hands-on and management resp. Will spend time supv. small prog. staff as well as coordinating the implementation of mfg. & fin. sys. Ideal bkgd. includes proj. ldr status, IBM 370 & COBOL exp. Degree. $23,000 (fee paid). Contact P. Siegel.

**ROBERT HALF**
**PERSONNEL AGENCIES**
1310 Liberty Bank Bldg.
Buffalo, N.Y. 14202
(716) 842-0801

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## RSTS/E PROGRAMMERS

We are in the midst of expanding our D.P. staff and are seeking experienced Basic+ programmers. We need self-reliant individuals with 1-4 years programming experience using the RSTS/E operating system preferably in a commercial environment. Please send your resume including salary history and requirements in confidence to:

**MELVIN SIMON & ASSOCIATES, INC.**

Data Processing Dept.
1712 N. Meridian St.
Indianapolis, Indiana 46202
*An Equal Opportunity Employer M/F*

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Computer

**OVERSEAS ASSIGNMENTS IRAN**
**SYSTEMS PROGRAMMERS & ANALYST**
**HIS6000 & GCOS exp.**

Salary range: $20,000-$30,000 base and benefits available.
For detailed information please call COLLECT
(703) 528-1282 or
(703) 528-5240

Sunday through Friday, 9:00 am to 8:00 pm or send your resume including salary history and family status to:

**CYBERMETRICS CORP.**
6825 Redmond Dr.-Suite 1
McLean, Virginia 22101
Equal Opportunity Employer M/F

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# DATA BASE PROFESSIONALS

Federated Department Stores, a national leader in retailing, has a major systems development program in progress that is committed to developing advanced retailing systems incorporating data base and distributed processing capabilities.

Advanced technologies include:

IMS/VS • MVS • NCP • SNA • VTAM •
VSAM • TSO • DATA DICTIONARY

Methods include: Top-Down design, HIPO, structured walk through, design review techniques, simulation.

We need EDP Professionals who are seeking challenge, innovation and development for the following positions:

## DATA BASE DESIGN ANALYST

Position requires in-depth background in IMS data base design, programming, and implementation. Data base internals helpful but not mandatory; COBOL background desired; VSAM and BAL a plus.

## DATA BASE SUPPORT MANAGER

Position requires technical background in IMS data base administration, including DBD generation, PSB generation, and data dictionary; management expereince, including supervision, good communicative skills and work load scheduling.

*If you are interested in exploring these exciting career opportunities, send your résume and salary requirements to:*

Mr. Frank McKain
Systems Research & Development, Room W-36
Federated Department Stores, Inc.
222 W. 7th St. Cincinnati, Ohio 45202

**ALL REPLIES HELD IN STRICT CONFIDENCE.**

*An Equal Opportunity Employer*

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# JOIN RAYTHEON SERVICE COMPANY AND GET THE BEST OF BOTH WORLDS.

First, your get growth potential because you'll be working with one of the fastest growing independent third party computer service company in the industry. Raytheon Service Company has built a successful reputation for responsive, responsible total system service over the last fifteen years and we're still growing.

Second, you'll be supported by a worldwide, multi-million dollar, organization with more than 50,000 employees. This means the best training, documentation equipment and parts inventory you'll find in any service operation — anywhere. Furthermore, you get the liberal benefits you'd expect of a FORTUNE 500 firm plus the challenge and opportunities of a successful smaller company.

Sound like a great opportunity? It is. So if you're interested, look into positions which currently exist in the following Raytheon Service Company locations:

Chicago
Dallas
Detroit
Minneapolis
New York
St. Louis
San Francisco Bay Area
Washington, D.C.

If you think you qualify, send your resume and salary history to David Murray, Raytheon Service Company, 2 Wayside Road, P.O. Box 503, Burlington, MA 01803. Or call 617-272-9300, ext. 302.

## CUSTOMER ENGINEERING OPENINGS

### SENIOR CUSTOMER ENGINEER

to handle the most complex installation, repair and maintenance tasks on a full-range of major customer equipment. This senior position carries a diversity of responsibilities for major accounts and includes responsibility for training other personnel and for functioning as regional technical support specialist.

### CUSTOMER ENGINEER

to install and service a variety of customer computer equipment. This includes preventative maintenance, troubleshooting, diagnostics and repair, and possibly account responsibility.

### ASSOCIATE CUSTOMER ENGINEER

to service a range of computer equipment: troubleshoot and diagnose common equipment problems and make repairs — under the direction of senior service personnel.

### CUSTOMER ENGINEER TRAINEE

an entry level position in customer service — to learn, under direct supervision, the troubleshooting, repair and maintenance of customer computer equipment.

These positions include experience with IBM 360/370 systems with compatible memories; IBM plug-compatible peripherals; Honeywell 200, 2000, and 3200 systems and related peripherals.

### NATIONAL TECHNICAL SUPPORT SPECIALIST

to assist in the development of business plans and equipment take-over . . . to analyze machine failures . . . to coordinate support efforts . . . and to carry on on-going review of field service staff and support requirements. Eight to ten years experience required.

### REGIONAL FIELD SALES REPRESENTATIVES

to pursue computer service sales activities in assigned territories. Compensation includes an attractive base salary plus a progressive commission plan. Candidates should have related direct sales experience.

RAYTHEON

**RAYTHEON SERVICE COMPANY**

*An Equal Opportunity Employer M/F*

## MANAGER—DATA PROCESSING SYSTEMS

Financial institution in Northwestern Pennsylvania is seeking a results oriented individual to manage our EDP staff. Successful candidate should have 3 to 7 years systems and programming experience including project and staff management. College background in computer science preferred. Salary commensurate with experience. Send resume and salary history to:

CW Box 4942
797 Washington St.
Newton, Mass. 02160

*An Equal Opportunity Employer M/F*

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# Systems & Programming
# IBM 168 MVS IMS

Increasing emphasis on our EDP department and our continuing growth have created a number of excellent positions within our leading pharmaceutical corporation for those qualified as:

## COMPUTER ANALYSTS

Requires knowledge of COBOL and experience in 370 using MVS and OS/JCL with college degree preferred. Working in marketing or financial systems, these persons should have strong systems background with at least 4 years experience in systems and programming. Must be capable of complex systems and program design and have good communications ability. Heavy user contact involved.

## SR PROGRAMMER ANALYSTS

Should have ANS COBOL experience and be familiar with IBM 370 using MVS and OS/JCL. Background in assembler language helpful. Must have minimum 3 years responsible programming and systems experience. Will work on complex programs developing new systems for manufacturing, marketing, and finance, with considerable user contact. Must be capable of complex program design; college degree preferred.

These are professional positions offering unusual challenge and potential for personal advancement within our organization. Compensation will be commensurate with background, and our benefits are exceptional, including educational assistance and profit sharing.

For immediate consideration, please send your resume including salary history and requirements to: Ms. Sheron Anderson, Schering-Plough Corporation, 1011 Morris Avenue, Union, N.J. 07083.

**SCHERING-PLOUGH CORPORATION**

WE ARE AN EQUAL OPPORTUNITY EMPLOYER M/F

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# PROGRAMMER-COBOL APPLICATIONS

## Looking For A Real Opportunity?

Our progressive Systems Development Department offers a challenging job to the highly motivated applications programmer. We have a 370/168 with MVS, IMS/VS installed and plans to expand with Distributed Processing.

We require:

- One year minimum COBOL applications programming experience.
- A four year college degree in Business Administration, Accounting or Computer Science is highly desirable.

We are the Consumer Products Division of the Fortune 500, NYSE-listed Schering-Plough Corporation. Our location is Memphis, Tennessee, one of the fastest growing cities in the nation offering a broad selection of cultural and recreational diversions in a mild mid-Southern climate. Additionally, we offer a comprehensive benefits package including relocation assistance and a competitive starting salary.

If you are interested in associating yourself with a dynamic organization in which EDP is a key organizational element — we want to hear from you!

*Please send detailed resume, including salary history, in strictest confidence to: Ken G. Stevens, Professional Employment Manager*

**Plough, Inc.**
An Equal Opportunity Employer M/F

Personnel Department
P. O. Box 377C
Memphis, Tenn. 38151

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MAYBELLINE SOLARCAINE MEXSANA
CORRECTOL FEEN-A-MINT ARTRA ASPERGUM
MUSTEROLE CHOOZ SARDO PAAS

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### EDP SPECIALISTS

Partial list (all fee paid) MGR MIS *mfg co bkgd $25-28K; Proj Mgr *lrge scale $23-25K; Proj Anal. *Cobol OS/VS $15-19K; Sys Anal/Prog *IMS mfg $18-22K; Sys Prog *VM/370*cp/cms $15-20M; Minis Sys/Prog *Many $15-20K; Tech Spc * Fortran/PL-1 $15-20K; Data Base * Ims/vsam $18-22K; Software Spec *all lang $15-22K; Mgr XEOP *S/3 RPG $16-20K. Send Resume (State earnings) to:

Andre Malek
**ROBERT HALF**
PERSONNEL AGENCIES
111 Prospect St.
Stamford, Conn. 06904
(203) 325-4158

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### SEATTLE

Leading Northwest data services firm is seeking qualified individuals to fill immediate openings at the Senior and Intermediate levels.

**DEC Systems Programmer**
Systems programmer needed for a PDP 11/70 RSTS/E system operating in a time-shared mode. Individual will be responsible for systems software, assist in establishing datacenter standards and procedures, and assist in hardware selection for OEM proposals.

**PROJECT LEADERS**
**Programmer/Analysts**
Minimum of two years experience in a business applications environment are required. Experiences in IBM 360/DOS, COBOL, PDP-11, RSTS/E, BASIC, or DIBOL are preferred.

Please send resumes to:
MANUS SERVICES CORP.
1700 Westlake Ave. North
Seattle, Wash. 98109
*Equal Opportunity Employer M/F*

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### NO ALTERNATIVES?

We can help you out of a professional dead end. We're the NPA affiliates with success in our DP backgrounds. Our fees are employer paid.

Benefit from our experience. We'll put you on a one-way street to fulfillment.

**AVAILABILITY, INC.**
Data Services Consultants
1300 N. Westshore Blvd.
Tampa, Fla. 33607
(813) 872-2631

**D. BROWN & ASSOCIATES**
Data Processing Division
610 S.W. Alder, Suite 711
Portland, Oregon 97205
(503) 224-6860

**ALFRED J. ALLEN & ASSOC., INC.**
999 N. Sepulveda Blvd., Suite 704
El Segundo, Calif. 90245
(213) 776-6852

National Personnel Associates®

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### FACULTY POSITION AVAILABLE

in Nuclear Engineering at the Assistant Professor level. Applicants must have background in Nuclear Engineering and strong capabilities in the application of minicomputer hardware and software to research. Capabilities in computer aided graphics design and the development of novel computer interfaces highly desirable. PhD degree required. Submit resume to: Professor J. Coralli, Executive Officer, Department of Nuclear Engineering, RENSSELAER POLYTECHNIC INSTITUTE, Troy, N.Y. 12181. An equal opportunity/afirmative action employer.

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### SANDY JONES Speaks Your Language . . .

Sandy Jones has talked to the major corporations. She knows where the great EDP openings and EDP dollars are — for analysts, reps, programmers.

Now, Sandy Jones wants to talk to you. With 10 years in systems, Sandy Jones can speak your language.

CALL: Ask for Sandy. (Or send resume in confidence)

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**EDP Career Opportunities, Inc.**
149 East Avenue
Norwalk, Ct. 06851
Affiliates in 8 major U.S. cities and Hawaii
*(Fees 100% paid by company)*

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# COBOL
## Programmer Analysts
## San Francisco Peninsula

Intel Corporation, the recognized leader in memory components and microprocessors, seeks talented COBOL professionals to join our in-house corporate computer services group.

You should have 4-10 years of COBOL programming background. You'll maintain and support applications systems in financial, marketing and manufacturing areas (manufacturing area requires MRP, BOM WIP). Involvement includes new systems development. The environment is real-time, on-line using Univac 1100/40 and DEC-10.

Located just 40 miles south of San Francisco, Intel reported 1976 sales up 65.2% to $226 million. For you, this can mean exceptional growth potential — and you can expect good relocation assistance.

For immediate and confidential consideration, please send your resume with salary history to:
Intel Employment, Dept. DP, 3065 Bowers Avenue, Santa Clara, California 95051.
An equal opportunity employer M/F.

MEMORY
SYSTEMS

intel

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## COMPUTER SOFTWARE OPENINGS WITH GROWING COMPANY

*AQUIDNECK DATA CORPORATION, an innovative new software consulting firm located in Middletown, Rhode Island, is hiring computer software specialists to fulfill commitments in Navy on-line systems for shipboard applications. Openings exist for qualfied professionals in system design, programming, documentation, and management.*

### THE COMPANY:

The company is founded on a philosophy which includes employee ownership and control; bonuses for excellent achievement; profit sharing; Management by Objectives; and an open, professional atmosphere.

### THE AREA:

Middletown, Rhode Island is located next to historic Newport, and is convenient to both the Providence and Boston metropolitan areas. It is pleasantly situated on the ocean and in peaceful rural surroundings. It offers a diversification of both winter and summer recreational activities.

### THE WORK:

AQUIDNECK DATA CORPORATION's business is based on identifying with the customer and solving his problems. For this reason, employees need excellent communication skills and an ability to function effectively in a team. There are opportunities for leadership and management, as well as technical achievement in the following areas:

### • SYSTEMS ANALYSIS

Systems Analysts at both the junior and senior levels are needed for software development projects. Required technical skills include computer program design, coding, checkout, documentation, and system integration. Experience is desired in AN/UYK-7 programming, particularly in on-line combat systems applications. Experience with CMS-2 and the AN/UYK-20 is also helpful.

### • SYSTEM TEST ENGINEEERS

Openings exist at senior level positions for consulting on the TRIDENT CSS integration/certification testing efforts. Requires knowledge of TRIDENT CCS and preferably experience in combat system testing.

### • ADVANCED SYSTEMS ANALYSIS

Positions are open for complex shipboard operational system design for mid-1980's submarines. Requires in-depth knowledge of state-of-the-art software architecture and development techniques. Prefer experience with on-line combat systems.

### • DOCUMENTATION

Senior level positions are open for candidates with technical writing experience in computer software documentation. Assembler language programming experience, knowledge of Navy combat systems, or systems analysis background is desired.

### • SOFTWARE CONFIGURATION MANAGEMENT

Individuals with experience in software configuration management and control of large scale software products are being hired. Recent experience with Navy combat systems and project management is desired.

If you are looking for an opportunity for personal growth, send a copy of your resume to:

Ms. Jan Lauver
**Aquidneck Data Corp.**
Box 99 • Middletown, Rhode Island • 02840
*an equal opportunity employer M/F*

## DIRECTOR OF COMPUTING

Oberlin College is seeking a Director of Computing who will be responsible for the planning and management of computing, including a computer facility which has a staff of 16, a budget in excess of $500,000, and a Sigma 9 mainframe. The Director reports to the Vice President/Provost.

Candidates must have a Master's degree and preferably a Ph.D., at least 5 years experience, and demonstrated management ability and technical competence in computing.

Salary range is $21,500 to $32,400; starting salary dependent upon qualifications.

Position is to be filled as soon as possible, preferably by July 1, 1977.

Submit letter of application and resume to James L. Powell, Provost, Oberlin College, Oberlin, Ohio 44074, by April 11, 1977.

*Affirmative Action (M/F) Equal Opportunity Employer*

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### UNIV. OF MASSACHUSETTS/AMHERST
### STAFF ASSOCIATE –
### DATA BASE MANAGEMENT SYSTEMS

Position available. Master's degree or equivalent professional experience. Previous experience and utilization of a data base management system in an academic environment. Five years of experience in programming and at least one year in application systems design and analysis. Previous experience and knowledge of college or university administration. Ability to work well with people in varied organizational relationships. Resume by April 22, 1977 to Bard F. White, Director, Management Systems, Whitemore Building, 01003. The University is an Affirmative Action/Equal Opportunity Employer. SA6A.

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# PROGRAMMER ANALYST

If you're seeking a job that combines an advanced environment with the chance to grow as your skills expand, contact International Playtex — a major, worldwide consumer goods manufacturer.

We're seeking an individual with 2 years of programming experience and a familiarity with COBOL. Previous exposure to MIS and a working knowledge of OS is helpful. A college degree and a knowledge of business applications — particularly for such areas as finance and marketing/sales — would be valuable.

If you qualify, we'll provide you with an attractive salary, a number of fine benefits and the advancement potential you want. Location is at our facility in an attractive mid-Delaware area. To apply, please send your resume, including salary history, to Mr. John Summers.

**INTERNATIONAL
PLAYTEX, INC.**

Box 631, Dover, DE 19901

*An Equal Opportunity Employer M/F Female applicants shall be considered on the same basis as male applicants.*

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# PROGRAMMER ANALYSTS

NCR Data Processing Division has immediate openings for Programmer Analysts in:

- **Software Development**
- **Firmware**
- **Diagnostic Programming**
- **O/S Project Lead**
  (Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributed processing, virtual machine, time sharing).

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents.

To arrange an appointment, please send resume immediately including salary history, training and experience to the Professional Placement Office at the address below.

NCR

Data Processing Division
16575 W. Bernardo Drive
San Diego, Calif. 92127

*An Equal Opportunity Employer*

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COMPUTER SYSTEMS

# SYSTEMS ANALYSTS and PROGRAMMERS

## Career Opportunities in Business Data Processing

American Management Systems, Inc. (AMS) is a nationwide firm specializing in the design and development of computer systems for business applications. In seven years we have grown to a $12 million (1976 sales) company; 1977 sales should exceed $16 million, and our five year plan is based on achieving a 30-35% annual growth rate. We design and implement custom systems using large scale computers, minicomputers, data base management software, teleprocessing software, etc. In addition, we develop proprietary software; operate a large data center, and a service bureau; provide COM and photocomposition services. The number of products and services we offer is continually expanding and creating excellent opportunities for advancement. The work is challenging and demanding, and performance is rewarded by excellent compensation. In 1977 we will be hiring 80-90 people who are looking for a challenge and a rewarding career.

## SYSTEMS ANALYSTS/ PROGRAMMERS

To work as senior or lead systems designers; to design and develop large, complex programs and/or to supervise a team of programmer analysts. Must have four or more years of relevant experience using IBM hardware and software. Data base management systems experience desired. Salary range $20-25,000. Openings available in our Arlington, N.Y., Chicago and San Francisco offices.

## PROGRAMMER/ ANALYSTS

To produce working programs from functional specifications; help devise and conduct systems tests; review results with clients and make changes; prepare user and program documentation; improve programming and designing skills. Must have two or more years of relevant experience using IBM hardware and software. Salary range $14-20,000. Openings available in our Arlington, N.Y., Chicago and San Francisco offices.

## PDP/70 AND HP3000 EXPERTS

To be lead designers for a large, complex order entry and scheduling system. Must have two years of intensive, implementation experience using manufacturer supplied operating systems on PDP11/70 or HP3000. Also must have systems design experience for on-line and order entry applications. Overall person should have five years of design and implementation experience. Salary range $22-28,000. Openings available in our San Francisco office.

We offer competitive salaries; opportunity for rapid advancement; company paid medical, life and disability insurance. For immediate consideration please send resume and salary history to:

Frank A. Nicolai, Exec. V.P.
**AMERICAN
MANAGEMENT SYSTEMS INC.**
1515 Wilson Boulevard
Arlington, VA 22209
*An Equal Opportunity Employer M/F*

ams
AMERICAN MANAGEMENT SYSTEMS INC.

An Equal Opportunity Employer M/F

# LEAD CICS DEVELOPMENT TEAM

The CBOE, the nation's central marketplace for trading stock options is seeking a lead on-line Programmer Analyst to design and implement applications. System will be run on IBM 370/158 MP (under MVS R3.7) interfacing with a real time system utilizing 30 minicomputers controlling over 300 CRT's. This system will add 300 plus terminals to this existing network.

Direct experience with CICS/VS transaction and data base recovery desirable as well as exposure to OS/VS1, MVS, VTAM, NCP and VSAM. Requires 2 years assembler language experience.

Our compensation package includes highly competitive salary, paid relocation, tuition reimbursement and company paid medical, dental and life insurance. For confidential consideration please send letter, resume or call collect (312) 431-6931 or 431-5763.

The ChicagoBoard Options Exchange

**Personnel Department**
**141 W. Jackson**
**Chicago, Illinois 60604**

An Equal Opportunity Employer M/F

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Reliance Telecommunication Electronics, a rapidly expanding and internationally recognized manufacturer of station carrier equipment, has immediate career opportunities for the following professionals. . .

## FINANCIAL PROJECT LEADER

To direct the software support of our rapidly expanding Data Processing Systems. You should have a bachelor's degree (or equivalent experience), a thorough knowledge of data processing systems and COBOL language and 3 to 5 years programming experience. Your responsibilities will include the design, implementation of new programs and systems, as well as the maintenance of existing systems and programs, system integrity and technical supervision of the programming section.

## PROGRAMMER/ANALYST

You should be experienced in general ledger, general accounts payable and receivable, payroll and fixed assets. This position requires a strong background in COBOL programming and data base techniques. A degree is preferred, but will consider equivalent work experience.

Reliance Telecom is one of the fastest-growing industries in the Dallas/Fort Worth area and offers excellent income, a comprehensive benefits program and outstanding opportunities for professional and personal growth.

**FOR IMMEDIATE ATTENTION, PLEASE SEND YOUR RESUME IN CONFIDENCE TO: RON STRICKLIN,**

**RELIANCE TELCOM**
SUBSIDIARY OF RELIANCE ELECTRIC

**P.O. Box 729, Euless, TX 76039**
*An Equal Opportunity Employer M/F*

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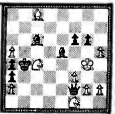
# CHALLENGE: YES!



**WHITE TO MOVE AND MATE IN THREE WITH BLACK'S COOPERATION (PROBLEM No. 7)**

YES! We are looking for talented and dedicated technicians who like to tackle challenges

ASC is the MOST successful international organization creating individually tailored software for many of the world's largest corporations.

Our business is expanding rapidly, we need good, solid, skilled programmers.

**SYSTEMS SUPPORT:**

Develop, install, modify, convert and maintain systems software including VSI, VSII, HASP, ASP, MVS, IMS, CICS, mini and microprocessors.

**APPLICATIONS SUPPORT:**

Create and implement customized business applications systems utilizing COBOL, PL/1, Assembler, IMS, CICS and MARK IV.

Give us a call and talk with us about the possibility of joining our congenial group of systems and application software technicians. We have immediate openings for many qualified people. Compensation is excellent and we are of course, an Equal Opportunity Employer M/F.

Phone toll free or
write (800) 543-7583

Ohio only
(collect) 513-890-1200

**Allen Services Corp.**
**DAYTON AIRPORT OFFICE**
**212 W. National Rd.**
**Vandalia, Ohio 45377**

P.S. We will be happy to supply the solution to the above problem on request.

---

# PROGRAMMER/ ANALYST

Requirements include a degree and a minimum of three years experience with ANS COBOL. Knowledge of data base/data communication systems and assembler language is a plus.

The successful candidate will participate in the development of a data base/data communication system using TOTAL and ENVIRON/1.

System includes IBM 370/138 with 512K under DOS/VS using POWER/VS facilities.

Company offers top starting salary, complete benefit package and good working conditions.

Send resume including salary requirements in confidence to:

**CW Box 4948**
**797 Washington St.**
**Newton, Mass. 02160**
*Equal opportunity employer M/W*

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## SYSTEMS ANALYST

**DATA BASE! BAL!**
**VSAM! IBM 370!**
**DOS-VS! COBOL!**

If these are more than just words — practical operating concepts with which you are familiar & have direct experience, we'd like to talk with you. We need an experienced (3-5 yrs.) systems analyst to plan, design and implement the data base & reporting systems for a growing Wisconsin-based casualty insuror. Insurance background preferred — but ability to interface with users at all levels is mandatory. True advancement opportunity, top salary & benefits to right person. Contact Personnel Director, (414) 458-9131 Ext. 226 or send resume to:

**HERITAGE INSURANCE**
**2300 Kohler Memorial Dr.**
**Sheboygan, WI 52081**
*Equal Opportunity Employer*

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# SENIOR PROGRAMMER/ ANALYST

## BANKING AND BURROUGHS EXPERIENCE

Immediate opening for individual with minimum 3 years experience in banking applications and COBOL. B3500/4700, IPS, NDL, assembler experience desirable. Send resume and salary requirements to:

**BARCLAYS BANK OF CALIFORNIA**
**P.O. Box 5340**
**San Jose, CA 95150**
**or call: (408) 244-3500 ext. 42**
*Affirmative Action Employer M/F*

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# Programmer/ Programmer Analyst

Blue Cross and Blue Shield of Southern West Virginia will be hiring two or three people in 1977 with the following background: Two to three years strong experience in IBM 360/370, COBOL, BAL and T.P. Insurance background.

Salary Open. Send resume to T. E. Morgan at the address below. All inquiries will be answered and kept in the strictest confidence. An equal opportunity employer M/F.

**Blue Cross. Blue Shield.**
of Southern West Virginia
P.O. Box 1353
Charleston, W. Va. 25325
(304) 348-5975

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# SYSTEMS PROGRAMMER ANALYST

Career opportunity with a major oil company in Houston for an individual with the following qualifications:

- **Several years of assembly language coding experience.**
- **Some large scale IBM SCP experience including systems generators, PTF application, etc.**
- **Additional experience in MVS, JES2, TSO. Teleprocessing, interactive graphics desirable.**
- **BS Degree in technical field preferred.**

For immediate consideration, send resume, salary requirements and college transcripts to:

**PERSONNEL MANAGER**
**P.O. Box 36487**
**Houston, Texas 77036**
*An Equal Opportunity Employer Dedicated to Affirmative Action*

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# COMPUTER ANALYST

Standard Oil Company (Indiana) has an opening at the Tulsa Data Center in peripheral systems evaluation and planning.

Minimum requirements:
. . . VM-CMS system experience
. . . 360/370 software/hardware interface knowledge
. . . CP internal knowledge

Applicant is expected to provide VM-CMS system performance analysis and consultation;

Two or three days travel each month.

Send detailed resume to:

IS&MS Recruiting Coordinator
Standard Oil Company (Indiana)
Room So 219
P.O. Box 591
Tulsa, Oklahoma 74102

All contacts will be strictly confidential.

AMOCO

Standard Oil Company (Indiana)
*An Equal Opportunity Employer M/F*

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# SYSTEMS PROGRAMMER

**Staff Increase**

Due to new systems development in both our on-line and batch computer applications as well as the upgrading of our data center and CPU power, we have decided to increase our technical staff. An outstanding opportunity now exists for an experienced IBM OS Systems Programmer.

Upgrading to OS from our current dual 370 DOS/VS environment is imminant and provides the challenge of having significant impact upon a major well planned conversion. You will be a key part of our technical staff that supports a 24 hour operation and 30 Application Analysts and Programmers.

The following experience is required:

- 3 or more years Systems Programming experience using IBM 370 hardware with OS
- A thorough knowledge of ALC
- CICS and communications equipment

The reputation our Data Processing organization holds as a progressive, technically advanced, zero turnover shop is unparalleled. The present opportunity is superb and well worth investigating for many reasons — one of which is being associated with the most outstanding team of data processing professionals and managers assembled in the Baltimore area.

We provide an excellent beginning salary as well as a total range of benefits including medical and dental insurance, disability insurance, tuition refund, profit sharing, and end of year employee dividend.

We invite you to telephone collect from Noon to 4 PM to discuss the position and to arrange for an after-hours interview or a weekend interview.

**(301) 547-6297**

The confidentiality of your interest is, of course, paramount to us. You may mail a resume if you desire.

**T.F. FOTI**

McCormick & Co. Inc.
**414 Light Street**
**Baltimore, Md. 21202**
*An Equal Opportunity Employer*

## SENIOR PROGRAMMER-ANALYST CICS

Fortune 500 company is seeking an outstanding Programmer Analyst for leadership position in CICS application design, programming and implementation.

Candidate must have strong CICS application and programming experience. Excellent opportunity to grow with major MIS professional staff expansion.

Desirable Eastern city in sports/outdoor recreation region. Excellent compensation and fringe benefits package.

Send resume and salary, in confidence, to:

**CW Box 4939**
**797 Washington St.**
**Newton, Mass. 02160**

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## SECOND ANNUAL PERTEC TRAINING CARAVAN

The Pertec Division of Pertec Computer Corporation is offering comprehensive training courses in the maintenance and repair of digital magnetic tape and disk drives during it's second annual Training Caravan beginning in June, 1977.

Last year's tour was so successful that we've expanded the 1977 schedule to include seven major U.S. cities: Atlanta, Miami, Dallas, Chicago, Boston, New Jersey and Washington, D.C.

Each week-long course will cover tape or disk drive operation, functional organization, interfacing, logic and mechanical design features, servo-alignment, troubleshooting techniques, as well as hands-on laboratory work.

These courses were formerly available only at Pertec Training Centers and private facilities. But now the Pertec Training Caravan brings our expert instructors to you and saves your company time and money.

The $550 enrollment fee includes the cost of all classroom materials, manuals, workbooks, and other related expenses.

If you would like more infomration on the classes near you, contact Shirley Hapner in the Pertac Division Training Department (213) 882-0030 X545.

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## SR. SCIENTIFIC PROGRAMMER ANALYST

We are seeking a responsible individual with a minimum of three years scientific programming experience on major computer systems utilizing FORTRAN. Knowledge of COBOL and IMS a definite plus. Degree preferred.

Responsibilities will include the analysis, design, development and implementation of scientific-oriented computer applications.

We offer an excellent compensation and benefits program and a professional growth-oriented work environment. Qualified applicants should submit resume including salary requirements to:

**Joan E. Efford**

ICI United States Inc.
Wilmington, Delaware 19897
An Equal Opportunity Employer M/F

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## VICE PRESIDENT DATA SERVICES

If you are currently in an executive position as chief administrator over a large data processing installation, this advertisement will be of interest to you.

As one of the largest major health care organizations in the nation, we seek a candidate to take responsibility in a highly visible executive position.

As Vice President of Data Services at Blue Cross and Blue Shield of Indiana, you will be responsible for one of the largest IBM installations in the Midwest. Our hardware configuration includes multiple 370 158/168 central processing units operating under MVS. We are rapidly expanding our systems with efforts directed towards IBM DB/DC, telecommunications and time-sharing. Our plans include doubling the size of our DATA Services division by the end of fiscal 1977.

Our ideal candidate will come from an insurance environment within a multi-divisional company and will possess at least ten years practical experience in data processing and five years upper management experience, preferably at the executive level. Any experience in the development of an IMS data base in a similar environment would also be of great help in this position.

We invite you to contact us for further information regarding this position or to make arrangements to visit our well-equipped Service Center in Indianapolis. Please direct telephone inquiries to Mark Baran (collect) at 1-317-263-4037 or mail your resume in complete confidence to:

**Blue Cross and Blue Shield of Indiana**
**120 West Market Street**
**Indianapolis, Indiana 46204**

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### ENGINEERS and PROGRAMMERS

## IF YOUR CAREER DOESN'T MEAN ANYTHING TO YOU, DON'T READ THIS AD!!

NCR's Terminal Systems Division in Millsboro, Delaware has unapralleled career opportunities for individuals interested in advancing state-of-the-art in POS terminals.

### SYSTEMS PROGRAMMER ENGINEER

- Experience with DEC PDP 11/35 or higher level computers required.
- Requires a background in minicomputer or microprocessor systems and/or associated application programming.

### SYSTEMS I/O-F/W PROGRAMMER

- Requires experience in general purpose applications minicomputer programming of peripheral devices, at the assembler level.
- Responsibilities will include the definition and supervision of coding of applications oriented F/W to interface POS terminal peripherals to the base ECR.

### COMMUNICATIONS F/W PROGRAMMER

- Requires experience in data communications minicomputer programming at the assembler level.
- Experience with RJE-type communications and synchronous protocols preferred. Knowledge of SDLC fundamentals a plus.

### DIAGNOSTIC ENGINEER/ PROGRAMMER

- Requires an engineer or hardware-minded programmer with minicomputer programming experience and a flair for the challenge of diagnostic test software.

### MANUFACTURING SYSTEMS ANALYST

- Inventory control, WIP, MRP and financial systems experience in a manufacturing environment required.

**All positions require a BS in EE, CS or related discipline.**

In addition to an unparalleled career opportunity within NCR, our Millsboro location offers comfortable living in a scenic and uncongested coastal area. The finest marine recreational areas, wildlife preserves, and beaches are within minutes of our Millsboro facility.

*If success interests you, please send your resume to:*

NCR

**Mr. Ron Tull, Dept. C-314**
**Terminal Systems Division-Millsboro**
**NCR Corporation**
**P.O. Box 607**
**Millsboro, Delaware 19966**

*An Equal Opportunity Employer M/F*

# DATA PROCESSING INSTRUCTORS
## FOR INTERNAL AND CUSTOMER EDUCATION

Policy Management Systems, a major division of Seibels, Bruce & Company, is the industry leader in computerized property and liability insurance software systems. Our history of solid growth has created career opportunities for Data Processing Instructors in our customer support team.

Do you have a strong background in COBOL, RPG II, Structured Programming, or Data Base concepts? Can you communicate effectively with groups? Are you interested in a rewarding career in computer education? Would you like to work in a dynamic environment where advancement is determined only by your results? If so, we would like to talk to you. Complete training will be provided. In addition, a complete research library will be at your disposal; both for course development and your own personal upgrading!

Please send resume and salary history to:

PMS

Larry Stern
Policy Management Systems
P.O. Box 1
Columbia, S.C. 29202

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## EDP AUDIT SPECIALIST

The St. Paul is seeking candidates interested in EDP Auditor positions. Primary responsibility will be the on-going review of the controls and security of general purpose support-software. Will be involved in the review of new or modified Data Base/Data Communications production systems to provide technical assistance in advanced system design for the EDP audit staff.

Experience with Data Base and/or Data Communications software is the prime requirement. Qualified candidates will have a minimum of five years experience in data processing with knowledge of COBOL, BAL and IBM systems software.

These excellent positions offer a liberal benefit package, tuition reimbursement plan, attractive salaries, assistance in relocation expenses to St. Paul/Minneapolis area, and an opportunity to work for a recognized leader in the insurance industry.

Interested persons should send resume or call (800) 328-9480 ext. 7005 for further information.

The St. Paul
Companies, Inc.
385 Washington Street
St. Paul, Minnesota 55102

The St. Paul

An equal opportunity employer

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# SYSTEMS PROGRAMMERS

Become a member of the team at Harris Data Communications that is working at the state-of-the-art level in developing a sophisticated family of distributed processing and data communications systems. Our products are used by many of the nation's leading corporations and work is not dependent upon government contracts or funding.

You should have a degree and two or more years, of ASSEMBLY-language programming experience. Knowledge of Operating Systems, Source Data Entry, Inquiry Response, Compilers and/or SDLC is desirable.

We offer excellent starting salaries, comprehensive benefits and a very convenient North Dallas location.

**For prompt consideration, call COLLECT, or send resume to: TOM BRYAN**

**214-620-4194**

HARRIS — COMMUNICATIONS AND INFORMATION HANDLING

HARRIS CORPORATION — Data Communications Division

P.O. Box 44076 — Dallas, TX. 75234

*an equal opportunity employer m/f*

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# Finding the best is what we do best.

Our staff is expert at finding "the best person for the job." Most of our placement managers are C.P.A.'s, C.A.'s, controllers or systems managers, the largest most experienced financial, banking and data processing service in the world.

We have expanded to 50 offices throughout the United States, Canada and also Great Britain.

We believe the combined talent and skill of Robert Half employees made us what we are today.

Maybe we're just what you're looking for.

**ROBERT HALF PERSONNEL AGENCIES**

World's Largest Financial & EDP Personnel Specialists.

Call us.
We're in the White Pages
in key areas throughout the
United States,
Canada and Great Britain.

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# R.S.T.S.

Opportunity to work in colorful Colorado with experienced Basic Plus Applications group. Must have degree in accounting or finance and R.S.T.S. experience. Send resume and salary requirements to:

**Michael M. Niernberg**
**EDI Computer Services**
**13693 East Iliff**
**Denver, Colo. 80232**
**(303) 758-4619**

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## *JOB SEEKERS!*

*Start Your Own Company!*

The newly published "How tto Start Your Own Minicomputer Business" is written by a trained computer professional from practical experience. Not a franchise plan, not a wild scheme, but simple step-by-step instructions on how to begin your own enterprise. Send $10 to: Handbook, CW Box 4946, 797 Washington St., Newton, Mass. 02160

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# Data Base

Informatics PMI, a division of Informatics Inc., is a specialist in data base design, analysis, programming and education. We are seeking a small number of outstanding individuals to join our team of data base consultants. If you are skilled and knowledgeable in the use of IMS or MARK IV and are interested in furthering your knowledge while assisting others in their use, we would like to discuss these opportunities with you.

We offer full time professional employment with excellent benefits. Please send your resume with current salary in complete confidence to:

## Informatics PMI

**500 E. Carson Plaza Dr.**
**Carson, California 90746**
*Equal Opportunity Employer*

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# SYSTEMS PROGRAMMERS (IBM/OS)

## *San Francisco Peninsula*

Challenging career openings currently exist for individuals with the following requirements:

- *2 years IBM 370 operating system experience, including OS internals, JCL and Assembler
- *IBM Communications experience with 2701, 3704 or 3705 hardware and software required. Design and maintenance of TP software packages such as CICS desired.
- *Knowledge of several languages including APL, COBOL, PL1 and FORTRAN. Experience with debugging and software optimization on techniques. Exposure to data management and scientific data processing applications essential.
- *BS degree in Computer Science, Mathematics or Physical Sciences

**POSITIONS ALSO AVAILABLE FOR**
***Programmer/Analysts *Scientific Programmer**

ESL is a leader in the field of reconnaissance, signal processing and communications systems. We offer exceptional professional growth opportunities, salaries and benefits in a creative, high technology environment.

Send resume and salary history to Arva Jost, Professional Employment, ESL, 495 Java Drive, Sunnyvale, CA 94086. An equal opportunity employer. U.S. Citizenship required.

ESL

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Digital Equipment Corporation is starting a new Final Acceptance and Test operation in Salem, New Hampshire. This is a unique opportunity for you to shape your own responsibilities and grow with one of the largest computer manufacturers in the world. The effort, talent and ambition you invest in this position can greatly influence the direction your career takes.

# Project Leader
## Support Systems

As the individual responsible for all plant support run on DECsystem-10, including applications in Finance, Administration, Manufacturing and Planning, you must coordinate every change and enhancement with all businesses in the plant as well as the Corporate Systems Group. This position requires a seasoned professional with at least 6 years experience in large-scale data processing, including 2 years in supervision and project management. A degree in Mathematics, Business, or Management, or equivalent is a must, and a manufacturing background is highly desirable.

*Forward resume outlining salary requirements to Jane Shea, Digital Equipment Corporation, Dept. JES, 32 Hampshire Road, Salem, New Hampshire 03079.*

digital
digital equipment corporation
an equal opportunity employer m/f

## ARE YOU MOVING ON?

## SR. Programmer Analyst

We are developing a new on-line order entry and manufacturing system to take advantage of the latest hardware (IBM 370-148), communications (CICS), data base (DL/1) technology. A successful candidate should have two to five years experience in applications programming and a desire to learn.

We offer an excellent starting salary and full company benefits including liberal vacations and holiday policy plus an opportunity for career advancement. If you are interested, please send resume in strictest confidence:

Ms. P. Foreat

**RUST-OLEUM CORP**
2301 Oakton
Evanston, Ill. 60204

*An Equal Opportunity Employer M/F*

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## TECHNICAL PLANNER

New Eng. Corp. expanding it's IBM Data Center. Indiv. with exp in Hdwre, software & T.P. Systems evaluation, justification, vendor contracts & IBM products qualifies for long term growth oppty. Salary to $23,000. (fee paid) Contact Stan Durbas.

**ROBERT HALF**
PERSONNEL AGENCIES
111 Pearl St.
Hartford, Conn. 06103
(203) 278-7170

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## BORROUGHS PROFESSIONALS ONLY

If you are a programmer programmer/analyst, systems analyst, or EDP professional and would like the most individualized job search offered in the data processing field today on a local or national level, forward your resume, with present salary and geographical preference, in strict confidence, to:

**E.D.P. SEARCH, Inc.**
P.O. Box 331
Hartford, Conn. 06101

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## Immediate openings for
## • *Systems Programmers*
## • *Software Sales*

Immediate openings are now available in areas of systems development, support, documentation and sales.

Deaborn is a 10-year-old, financially solid, bundled lessor of IBM 360/370 hardware and marketer of enhanced DOS-DOS/VS systems. We offer outstanding salary, non-contributory benefit plans, unlimited opportunity for advancement (and lots of fun!).

If you are currently a top systems programmer and consider yourself to be a pro with solid experience to contribute, contact Mr. Orv. Wiseman, Vice President, Systems Support, for a confidential interview — 671-4410.

dc **dearborn** computer leasing company
hardware 360s/370s • systems software • brokerage
4649 n. scott st., schiller park, IL 60176 chicago (312) 671-4410

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## ENGINEERING APPLICATIONS PROGRAMMER

In the Planning Division of Nebraska Public Power District at Columbus, Nebraska. Requires degree in engineering, math or computer science with experience in Fortran and PL/1 programming. Responsibilities entail independent program development, testing, documentation and application in the areas of engineering economics, statistical analysis, production costing, stability and loadflow. Excellent fringe benefits. Contact:

R.L. Walgren, Personnel Mgr.
Nebraska Public Power District
P.O. Box 499
Columbus, NE 68601
(402) 563-5450

*An equal opportunity employer*

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**Computer Center Director**

Georgia State University is accepting applications for the position of Computer Ctr. Director.

Duties include policy determination, development and management of a computer center with a staff of 63 currently utilizing two Univac 70/7's. This position carries faculty rank or status and reports to the Vice President of Research and Academic Sciences.

Advanced avademic degrees and previous experience in computer management are desirable. Salary will be commensurate wtwith experience and qualifications.

Send applications including resume and four references to Chairman, Search Committee Computer Center Director, Box Numbel 660, Georgia State University, University Plaza, Atlanta, Ga. 30303.

Deadline for receipt of applications is Friday, April 15, 1977.

*Gaorgia State University is an equal opportunity affirmative action employer*

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**Immediately**
**Data Processing Opportunities**

Multi plant company located in South-Central Mississippi, has immediate openings for System Programmers, Application Programmers and Systems Analysts. These openings are due to expansion and installation of new equipment for on-line systems.

Candidates should have a degree, and a minimum of four years experience, preferable using Cobol on IBM equipment.

If you want to join a young dynamic Data Processing staff working for a company that offers excellent benefits and long term growth potential. send resume to: **CW Box 4934, 797 Washington St., Newton, MA 02160** *An Equal Opportunity Employer.*

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**Manager of Information Resources**
**Lincoln University**

Lincoln University, an 1100-student liberal arts college 50 miles southwest of Philadelphia, is seeking an EDP professional to develop and administer the computing function. Reporting at the Vice-Presidential level, the Manager of Information Resources will be responsible for converting from the current IBM 1130 system to a minicomputer based timesharing operation serving academic and administrative uses.

Requirements: 5 years in data processing including 2 years in management, preferably in higher education, a knowledge of CAI/CMI, data management, systems analysis and programming — BASIC, FORTRAN, APL.

Masters Degree in Computer Science or Business Administration. Salary - to $22,000.

Send resume to Mr. Donald L. Mullett, Vice President for Fiscal Affairs, Lincoln University, Lincoln University, PA. 19352.

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## The Professional Approach To Career Planning

# The New 1977 Computer Salary Survey

## Call for your free copy today!

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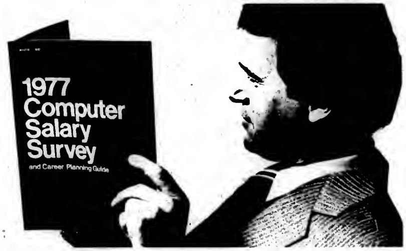

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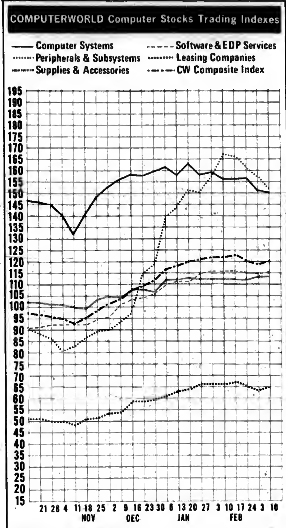
COMPUTERWORLD Computer Stocks Trading Indexes

# Earnings Reports

**COMPUGRAPHIC**
Three Months Ended Jan. 1

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.99 | $.86 |
| Revenue | 29,162,000 | 21,636,000 |
| Earnings | 2,236,000 | 1,601,000 |

**COMPUTER COMMUNICATIONS**
Three Months Ended Dec. 31

| | 1976 | 1975 |
|---|---|---|
| Shr Ernd | $.17 | $.06 |
| Revenue | 3,353,360 | 1,656,195 |
| Tax Cred | 240,000 | 88,000 |
| Earnings | 502,895 | 176,504 |
| 6 Mo Shr | .30 | .12 |
| Revenue | 6,421,614 | 3,327,921 |
| Tax Cred | 420,000 | 166,000 |
| Earnings | 875,470 | 335,405 |

**BUNKER RAMO**
Year Ended Dec. 31

| | 1976 (000) | 1975 (000) |
|---|---|---|
| Shr Ernd | $1.19 | .... |
| Revenue | 319,429 | $289,059 |
| Tax Cred | 1,680 | .... |
| Earnings | 9,408 | a(13,844) |
| 3 Mo Shr | .83 | .... |
| Revenue | 74,661 | 70,585 |
| Earnings | 3,899 | a(11,947) |

a-Reflects $7 million pretax provision for loss on disposition of Esis product line.

**CONTROL DATA**
Year Ended Dec. 31

| | 1976 (000) | 1975 (000) |
|---|---|---|
| Shr Ernd | $2.80 | $2.20 |
| Revenue | 1,356,259 | 1,246,369 |
| Spec Cred | 1,070 | 762 |
| Earnings | 48,553 | 37,574 |
| 3 Mo Shr | .68 | .47 |
| Revenue | 387,477 | 354,785 |
| Spec Cred | 470 | 462 |
| Earnings | 17,869 | 9,310 |

a-Restated to reflect foreign currency translation.

**CRAY RESEARCH**
Year Ended Dec. 31

| | 1976 | a1975 |
|---|---|---|
| Loss | $1,550,738 | ..... |
| 3 Mo Loss | 555,217 | ..... |

a-Comparable figures not available, company went public in March 1976.

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# Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MARCH 9, 1977

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

### COMPUTER SYSTEMS

| EXCH | | PRICE 1976-77 RANGE (1) | CLOSE MAR 9 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | AMDAHL CORP | 23- 40 | 28 | -4 | -12.5 |
| N | BURROUGHS CORP | 66-108 | 66 | -2 5/8 | -3.8 |
| O | COMPUTER AUTOMATION | 10- 25 | 22 3/8 | - 1/8 | -0.5 |
| N | CONTROL DATA CORP | 19- 27 | 22 1/2 | + 1/4 | +1.1 |
| N | DATA GENERAL CORP | 40- 60 | 41 3/4 | - 3/4 | -1.7 |
| O | DATAPOINT CORP | 20- 48 | 21 1/4 | +1 3/4 | +8.9 |
| N | DIGITAL EQUIPMENT | 41- 60 | 41 1/4 | -2 3/4 | -6.2 |
| N | ELECTRONIC ASSOC. | 2- 4 | 2 1/4 | 0 | 0.0 |
| A | ELECTRONIC ENGINEER. | 7- 18 | 7 7/8 | - 1/4 | -3.0 |
| O | FOUR-PHASE SYSTEMS | 13- 21 | 14 3/8 | + 1/8 | +0.8 |
| N | FOXBORO | 28- 51 | 46 3/4 | +2 1/4 | +5.0 |
| O | GENERAL AUTOMATION | 4- 11 | 7 | 0 | 0.0 |
| O | GRI COMPUTER CORP | 1- 1 | 1/2 | 0 | 0.0 |
| N | HEWLETT-PACKARD CO | 69-117 | 71 1/2 | - 1/4 | -0.3 |
| N | HONEYWELL INC | 34- 56 | 48 | + 1/2 | +1.0 |
| N | IBM | 227-288 | 275 5/8 | +3 1/8 | +1.1 |
| O | MANAGEMENT ASSIST | 1- 9 | 7 3/4 | + 1/4 | +3.3 |
| C | MEMOREX | 17- 33 | 25 7/8 | - 3/4 | -2.8 |
| O | MICRODATA CORP | 7- 25 | 9 1/4 | +2 1/8 | +29.8 |
| O | MODULAR COMPUTER SYS | 3- 14 | 5 3/8 | - 1/2 | -8.5 |
| N | NCR | 24- 38 | 34 3/8 | - 1/8 | -0.3 |
| O | PRIME COMPUTER INC | 4- 18 | 15 | + 1/2 | +3.4 |
| N | PERKIN-ELMER | 18- 27 | 17 3/4 | -1 1/4 | -6.5 |
| N | RAYTHEON CO | 45- 67 | 55 | -2 5/8 | -4.5 |
| N | SPERRY RAND | 38- 52 | 37 1/2 | - 5/8 | -1.6 |
| O | SYCOR INC | 9- 31 | 10 5/8 | - 1/2 | -4.4 |
| A | SYSTEMS ENG. LABS | 5- 10 | 6 1/8 | - 3/8 | -5.7 |
| N | VARIAN ASSOCIATES | 12- 19 | 17 | - 1/2 | -2.8 |
| A | WANG LABS. | 11- 20 | 17 1/8 | - 3/8 | -2.1 |

### LEASING COMPANIES

| EXCH | | PRICE 1976-77 RANGE (1) | CLOSE MAR 9 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BOOTHE COMPUTER CORP | 1- 9 | 9 1/2 | - 1/4 | -2.5 |
| O | COMDISCO INC | 3- 13 | 10 3/4 | -1 | -8.5 |
| A | COMMERCE GROUP CORP | 2- 3 | 1 7/8 | 0 | 0.0 |
| A | COMPUTER INVSTRS GRP | 1- 3 | 1 1/8 | - 1/8 | -10.0 |
| M | DATRONIC RENTAL | 1- 4 | 1 1/4 | - 1/8 | -9.0 |
| A | DCL INC | 1- 2 | 1 1/2 | - 1/8 | -7.8 |
| N | DPF INC | 5- 8 | 7 | 0 | 0.0 |
| N | ITEL | 8- 16 | 13 3/4 | - 5/8 | -4.3 |
| N | LEASCO CORP | 6- 22 | 19 | - 3/8 | -1.9 |
| O | LEASPAC CORP | 0- 1 | 3/4 | 0 | 0.0 |
| O | KPG INC | 0- 1 | 1/4 | 0 | 0.0 |
| A | PIONEER TEX CORP | 8- 11 | 8 3/4 | 0 | 0.0 |
| N | U.S. LEASING | 7- 12 | 9 7/8 | - 1/8 | -1.2 |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

### SOFTWARE & EDP SERVICES

| EXCH | | PRICE 1976-77 RANGE (1) | CLOSE MAR 9 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 1- 3 | 1 3/8 | - 1/8 | -8.3 |
| O | ANACOMP INC | 8- 11 | 8 3/8 | + 1/4 | +3.0 |
| A | APPLIED DATA RES. | 2- 7 | 5 7/8 | + 1/4 | +4.4 |
| N | AUTOMATIC DATA PROC | 17- 35 | 23 5/8 | + 3/4 | +3.2 |
| O | COLEMAN AMERICAN COS | 2- 8 | 2 1/8 | 0 | 0.0 |
| O | COMPU-SERV NETWORK | 3- 14 | 13 3/4 | 0 | 0.0 |
| O | COMP ELECTION SYSTMS | 5- 9 | 6 3/4 | + 1/4 | +3.8 |
| O | COMPUTER HORIZONS | 1- 2 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER NETWORK | 2- 9 | 6 3/8 | - 1/8 | -1.9 |
| N | COMPUTER SCIENCES | 4- 9 | 7 5/8 | 0 | 0.0 |
| O | COMPUTER TASK GROUP | 1- 2 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER USAGE | 2- 6 | 2 1/2 | - 1/8 | -4.7 |
| O | COMSHARE | 2- 9 | 5 1/2 | 0 | 0.0 |
| O | DATA DIMENSIONS INC | 2- 9 | 4 5/8 | 0 | 0.0 |
| O | DATATAB | 1- 2 | 1 7/8 | 0 | 0.0 |
| N | ELECTRONIC DATA SYS. | 12- 19 | 16 1/4 | + 3/8 | +2.3 |
| O | INFONATIONAL INC | 1- 1 | 1/8 | 0 | 0.0 |
| O | INSYTE CORP | 1- 3 | 2 | - 1/4 | -11.1 |
| O | IPS COMPUTER MARKET. | 1- 2 | 3/4 | 0 | 0.0 |
| O | KEANE ASSOCIATES | 2- 4 | 3 | + 1/2 | +20.0 |
| O | KEYDATA CORP | 1- 5 | 2 5/8 | - 3/8 | -12.5 |
| A | LOGICON | 3- 12 | 11 1/2 | +1 3/8 | +13.5 |
| A | MANAGEMENT DATA | 1- 3 | 1 3/8 | 0 | 0.0 |
| A | NATIONAL CSS INC | 13- 25 | 20 | - 5/8 | -3.0 |
| O | NATIONAL DATA CORP | 4- 7 | 5 5/8 | 0 | 0.0 |
| A | ON LINE SYSTEMS INC | 17- 23 | 19 3/4 | + 3/8 | +1.9 |
| N | PLANNING RESEARCH | 3- 5 | 3 3/4 | + 1/8 | +3.4 |
| O | PROGRAMMING & SYS | 1- 1 | 1/2 | + 1/8 | +33.3 |
| O | RAPIDATA INC | 2- 5 | 2 | - 1/4 | -11.1 |
| O | REYNOLDS & REYNOLDS | 13- 21 | 17 1/2 | 0 | 0.0 |
| O | SCIENTIFIC COMPUTERS | 1- 2 | 2 | + 1/2 | +33.3 |
| O | TYMSHARE INC | 14- 28 | 16 1/4 | + 1/2 | +3.1 |
| A | UFS SYSTEMS | 3- 5 | 4 | 0 | 0.0 |
| N | WYLY CORP | 1- 7 | 1 5/8 | 0 | 0.0 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1976-77 RANGE (1) | CLOSE MAR 9 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | ADDRESSOGRAPH-MULT | 8- 14 | 11 3/8 | - 7/8 | -7.1 |
| O | ADVANCED MEMORY SYS | 4- 13 | 7 | - 1/4 | -3.4 |
| N | AMPEX CORP | 5- 10 | 7 7/8 | + 1/8 | +1.8 |
| O | ANDERSON JACOBSON | 2- 4 | 3 3/4 | 0 | 0.0 |
| O | APPLIED DIG DATA SYS | 10- 25 | 11 | -1 1/4 | -10.2 |
| O | BEEHIVE MEDICAL ELEC | 3- 12 | 10 | + 1/8 | +1.2 |
| A | BOLT,BERANEK & NEW | 7- 11 | 7 5/8 | + 1/2 | +7.0 |
| N | BUNKER-RAMO | 5- 12 | 11 5/8 | + 1/2 | +4.4 |
| A | CALCOMP | 3- 7 | 3 1/4 | - 1/8 | -3.7 |
| O | CAMBRIDGE MEMORIES | 0- 6 | 1 | + | +6.2 |
| N | CENTRONICS DATA COMP | 20- 36 | 23 7/8 | + 3/4 | +3.2 |
| O | CODEX CORP | 22- 47 | 43 3/4 | +1 | +2.3 |
| O | COGNITRONICS | 1- 1 | 1 | 0 | 0.0 |
| O | COMPUTER COMMUN. | 1- 6 | 5 7/8 | + 3/4 | +14.8 |
| O | COMPUTER CONSOLES | 4- 7 | 4 | 0 | 0.0 |
| A | COMPUTER EQUIPMENT | 1- 3 | 2 1/8 | 0 | 0.0 |
| O | COMPUTER TRANSCEIVER | 1- 3 | 1 1/8 | 0 | 0.0 |
| O | CONTEN | 4- 13 | 11 1/4 | - 1/4 | -2.1 |
| A | CONRAC CORP | 20- 27 | 24 3/8 | - 1/8 | -0.5 |
| O | DATA ACCESS SYSTEMS | 1- 5 | 5 1/4 | 0 | 0.0 |
| O | DATA 100 | 8- 13 | 7 3/4 | 0 | 0.0 |
| A | DATA PRODUCTS CORP | 5- 15 | 10 3/4 | 0 | 0.0 |
| O | DATA TECHNOLOGY | 1- 3 | 2 7/8 | + 1/4 | +9.5 |
| O | DATUM INC | 1- 2 | 1 3/8 | 0 | 0.0 |
| O | DECISION DATA COMPUT | 1- 4 | 2 1/8 | + 1/8 | +8.2 |
| O | DELTA DATA SYSTEMS | 1- 1 | 1/2 | 0 | 0.0 |
| N | ELECTRONIC M & M | 1- 4 | 3 7/8 | - 1/8 | -3.1 |
| O | FABRI-TEK | 1- 1 | 1 1/4 | + 1/8 | +17.5 |
| O | GENERAL COMPUTER SYS | 0- 2 | 1/2 | 0 | 0.0 |
| N | HAZELTINE CORP | 4- 12 | 10 3/8 | + 3/8 | +3.7 |
| N | HARRIS CORP | 27- 35 | 32 3/8 | + 5/8 | +1.9 |
| A | INFOTERM CORP | 9- 20 | 13 3/8 | - 5/8 | -4.4 |
| O | INFOREX INC | 3- 7 | 5 5/8 | 0 | 0.0 |
| O | INFORMATION INTL INC | 10- 19 | 11 3/8 | 0 | 0.0 |
| O | INTEL CORP | 47-109 | 55 1/2 | 0 | 0.0 |
| A | LUNDY ELECTRONICS | 3- 7 | 3 1/2 | - 1/8 | -3.4 |
| O | MSI DATA CORP | 3- 8 | 7 3/8 | + 1/4 | +3.5 |
| N | MILGO ELECTRONICS | 15- 37 | 37 1/8 | 0 | 0.0 |
| N | MOHAWK DATA SCI | 3- 10 | 6 1/4 | + 1/8 | +2.0 |
| O | PENRIL CORP | 1- 3 | 4 | +1 | +33.3 |
| A | PERTEC CORP | 3- 9 | 6 3/4 | - 1/2 | -6.9 |
| A | POTTER INSTRUMENT | 2- 2 | 1 3/4 | 0 | 0.0 |
| O | PRECISION INST. | 2- 13 | 2 | 0 | 0.0 |
| O | QUANTOR CORP | 4- 6 | 4 3/4 | 0 | 0.0 |
| O | RECOGNITION EQUIP | 6- 11 | 7 5/8 | - 3/8 | -4.8 |
| O | SCAN DATA | 1- 4 | 1 3/8 | 0 | 0.0 |
| O | STORAGE TECHNOLOGY | 9- 13 | 11 | - 3/8 | -3.2 |
| O | T BAR INC | 9- 13 | 7 7/8 | 0 | 0.0 |
| O | TALLY CORP. | 4- 6 | 5 | - 3/8 | -6.9 |
| O | TEC INC | 3- 9 | 7 1/2 | 0 | 0.3 |
| N | TEKTRONIX INC | 45- 69 | 57 5/8 | - 1/8 | -0.2 |
| N | TELEX | 2- 5 | 2 7/8 | + 1/8 | +4.5 |
| O | WILTEK INC | 1- 2 | 1/4 | 0 | 0.0 |

### SUPPLIES & ACCESSORIES

| EXCH | | PRICE 1976-77 RANGE (1) | CLOSE MAR 9 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BALTIMORE BUS FORMS | 3- 5 | 2 7/8 | 0 | 0.0 |
| A | BARRY WRIGHT | 6- 12 | 10 1/2 | 0 | 0.0 |
| O | CYBERMATICS INC | 0- 1 | 5/8 | 0 | 0.0 |
| O | DUPLEX PRODUCTS INC | 13- 24 | 17 3/8 | + 3/8 | +2.2 |
| N | ENNIS BUS. FORMS | 6- 8 | 6 1/4 | + 1/4 | +4.1 |
| O | GRAHAM MAGNETICS | 8- 14 | 12 1/2 | -1 | -7.4 |
| O | GRAPHIC CONTROLS | 13- 19 | 14 3/4 | - 1/4 | -1.8 |
| N | 3M COMPANY | 49- 85 | 51 | + 1/8 | +0.2 |
| O | MOORE CORP LTD | 31- 51 | 31 1/4 | - 1/4 | -0.7 |
| N | NASHUA CORP | 11- 20 | 18 | - 5/8 | -3.3 |
| O | STANDARD REGISTER | 15- 23 | 20 | + 1/2 | +2.5 |
| O | TAB PRODUCTS CO | 5- 17 | 16 1/2 | + 1/2 | +3.1 |
| N | UARCO | 19- 25 | 21 | - 1/4 | -1.1 |
| A | WABASH MAGNETICS | 4- 14 | 11 5/8 | 0 | 0.0 |
| N | WALLACE BUS FORMS | 19- 25 | 19 | + 1/8 | +0.8 |

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